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October 4, 1934

Engineering News-Record

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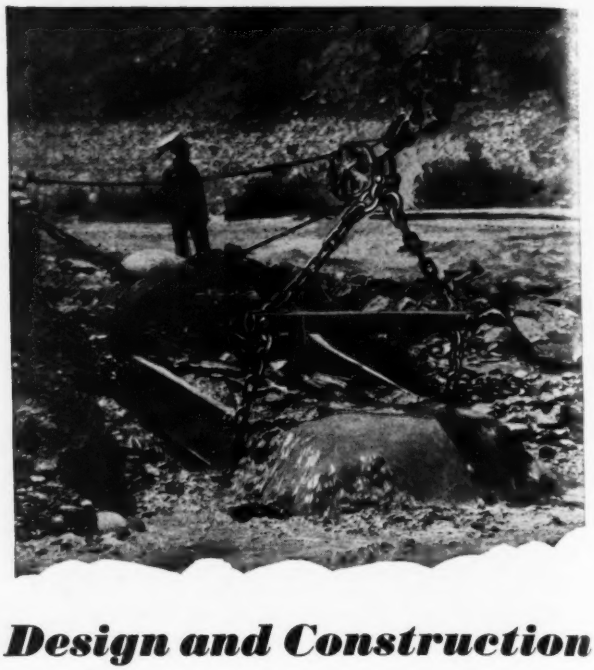

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To Insure the Soul

MORE than twenty years ago, while testifying before a Senate committee, the late J. Pierpont Morgan made a statement that became one of his most widely publicized and oft-quoted utterances. He said, in effect, that the essential element in a sound loan is the character of the borrower. Collateral and other guarantees have their place as insurance on the safety of the loan but, after all, character is the essential security and without it, any borrower is a hazard. Indeed, many millions are loaned on no security other than the known character of the borrower. Established character, then, is a basic asset for any individual.

It is important to emphasize that word "established." For what Mr. Morgan really had in mind involved reputation as much as it did character. It is the recognized and accepted character, the established character, that makes a banker regard a borrower as a good risk. It is the scope of such recognition and the degree of such confidence that measure the commercial value to a man of his character, however fine it actually may be.

So also with a business house, its product or its service. Here, too, reputation, or established character, is a basic asset. And just as Mr. Morgan esteemed it the most essential element of personal credit, so is it the most essential element in the value of a business.

A manufacturer may view without panic the destruction of his factory building. This is one of his assets, but quite possibly he can afford to write it off and build a new plant so much more efficient that he will be the gainer from the experience. He may even survive the loss of a formula, a patent or some other valuable element of his business, for these too might be replaced by some even more valuable substitute.

But the one asset with which he dare not part is his reputation on the market place. Intangible or imponderable though they may be, he cannot regard lightly the loss of a name or a trademark once these have been imposed upon the mind of his market; he cannot view complacently the danger of losing the recognition of his goods, his service or his stability. In other words, he dare not risk the loss of his reputation, as it has been established in the mind of his market.

Take all else from him except that, and he still has the soul of his business around which he may yet manage to create a new body. But without that he has left but the hollow and fragile shell of that business.

For reputation is the delicate essence of years of effort and anxiety. Into its establishment he has poured his genius, skill and energy. Into it have gone the sacrificed capital of development days and the plowed-in earnings of early production. It comprises years of making good on blunders, experiments and mishaps. To develop it, earnings may have been poured for decades into sales and promotion efforts that could show but meager current return.

Once lost, reputation cannot be improvised like a new plant or an improved product. Time normally is of the essence of its creation.

It is true that by judicious promotion and advertising the development of this priceless asset may be accelerated. It is even true that by very heavy investment it may be forced into being over a relatively short time. But it is a distinctive characteristic of reputation that, once established, it can be maintained at a much smaller cost than was required to create it, and at infinitely smaller cost than would be required to reestablish it, once it has been suffered to collapse or to dwindle from neglect or mismanagement.

In these days it is worth while for every established business to guard well this basic asset. We are in a period of transition: old faces, old firms, old customers have passed and are passing. The atmosphere has not been the sort in which reputation flourishes naturally. The promotional and advertising effort required to safeguard it involves but a trifling premium to pay for an insurance policy on so precious an asset.

Willard Chevalier

ENGINEERING NEWS-RECORD

Published every Thursday. Vol. 113, No. 14. Price 25c. per copy. Subscription, domestic, Mexico, Central and South American countries, $5 per year. Canada, including duty, $7.50. All other countries, $9 a year or 36 shillings. Entered as second class matter April 11, 1917, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U.S.A. Cable Address "McGrawhill, New York." Member A.B.P. Member A.B.C. Copyright 1934 by

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

Editorial and Publishing Offices: 330 West 42d Street, New York; 520 North Michigan Avenue, Chicago; 883 Mission Street, San Francisco; Aldwych House, London, W. C. 2, England. Branch Offices: Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Greenville, S. C.

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"The pipe is wonderful and we won't use anything else"*

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F. E. SCHMITT, *Editor*

WILLARD CHEVALIER, *Vice-President*

Editorial Staff
F. W. Herring
H. W. Richardson
J. I. Ballard
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In the News:

ST. LOUIS voted down a $5,878,000 bond issue to build 120 miles of trunk sewer in a county sanitary district, and thereby postpones an outstanding sanitary project and loses a $1,349,000 grant from the PWA.

A LOW BID OF $7,918,530 has been received by the Corps of Engineers for building the spillway at the Fort Peck Dam project. The size of the undertaking is indicated by an item of 13,000,000 cu.yd. of excavation.

ON OCTOBER 28 San Francisco plans to celebrate the completion of the Hetch Hetchy water-supply development and open the 150-mile aqueduct line for delivery into local reservoirs. Secretary of the Interior Ickes is scheduled to attend the ceremonies. The project was reviewed in *ENR*, Aug. 2, 1934.

QUEBEC, CANADA, is again facing a water shortage, and an educational campaign against wastage of water is considered.

POLICY OF THE PWA on the question of repayment of capital costs of river improvement, flood control and power projects that are built by the Corps of Engineers and the Bureau of Reclamation has been definitely announced by Administrator Ickes. The statement is quoted in the news section of this issue.

THAT MUNICIPAL OR LOCAL publically-owned projects will receive PWA aid only when they assure power to communities at rates substantially lower than otherwise obtainable, is the basic policy enunciated by Administrator Ickes, clarifying this moot point.

In This Issue:

TO CURB the destructive flow of the Rio Grande River where it forms the international boundary between the United States and Mexico, the two federal governments have undertaken a program of channel rectification and flood control. Work now being executed will cost $12,600,000 and includes levee construction, a 400,000,000-cu.yd. earth dam and provision of floodways in the lower end of the valley. The article reviews the planning and outlines operation projects now under way.

AS A MORE RATIONAL METHOD of evaluating the efficiency of filters in water-treatment plants, a suggestion is advanced to use the "quantity filtered per foot of head loss" as a measure.

A 6,400-FT. WIDTH OF RIVER at the site of Wheeler Dam and navigable water across this distance resulted in the decision of the TVA to use barge-mounted equipment to mix the 500,000 cu. yd. of concrete. General plans for concreting and the special features of the cement handling and batching equipment are described in two consecutive articles.

PROOF that accidents in construction work are avoidable and can be reduced by active safety campaigns was positively demonstrated by the program instituted during the CWA operations of last winter. The article indicates the problem of safety in any made-work program and describes the CWA campaign and the results obtained.

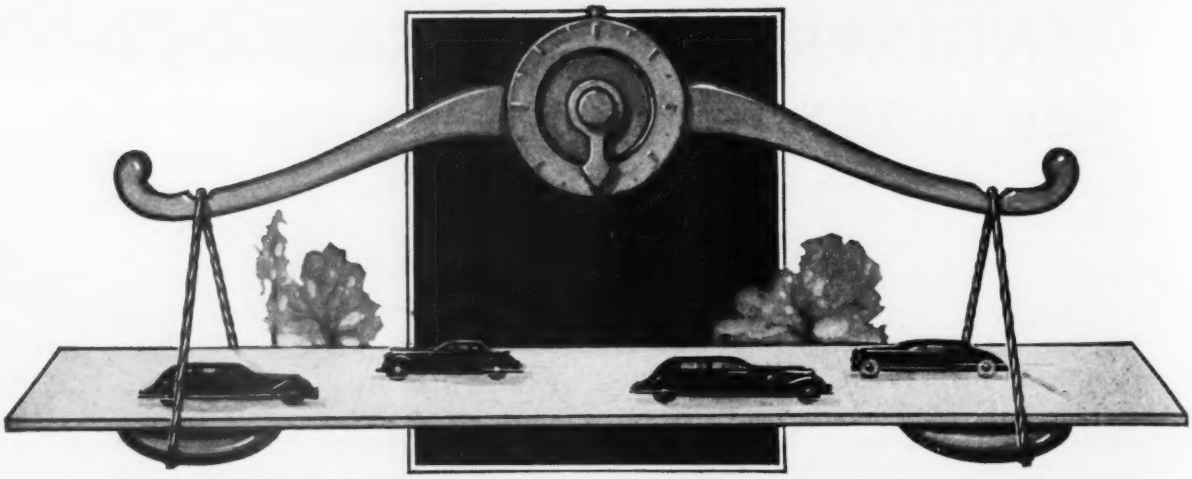
THE FIRE INSURANCE COMPANIES which count upon a constantly available supply of water at the plants that they insure have become alarmed at the potential danger to elevated tanks in earthquake zones. At M.I.T. they are sponsoring an investigation of elevated-tank behavior under reduced earthquake motions. On the basis of preliminary results, they suggest an entirely new design approach that takes into account the dynamic character of the forces.

THE RESTUDY of the possibilities of timber in bridge construction carried out by Oregon state highway engineers has borne fruit in a number of interesting structures. The composite timber and concrete deck with daps and nails for a sheer connection has been used on more than 100 bridges. In this issue a tall viaduct of prefabricated members and pleasing appearance is described.

THE JOINT MEETING of the American Society of Municipal Engineers and the International Association of Public Works Officials, held last week at Rochester, N. Y., is reported in this issue.

Coming Articles:

COOLING OF THE CONCRETE in Boulder Dam is one of the notable features of the entire construction program. The artificial removal of the heat of hydration from mass concrete, to accelerate final volume change and enable early grouting, provided unprecedented problems and have aroused wide interest and conjecture among engineers. These operations have now been in progress one year, and the Bureau of Reclamation is able to report authentic data describing the cooling process and the results obtained. Next week an article by Byram W. Steele, designing engineer on dams, Bureau of Reclamation, presents this information.



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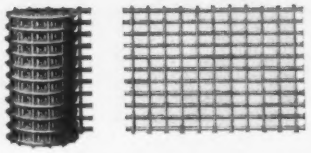

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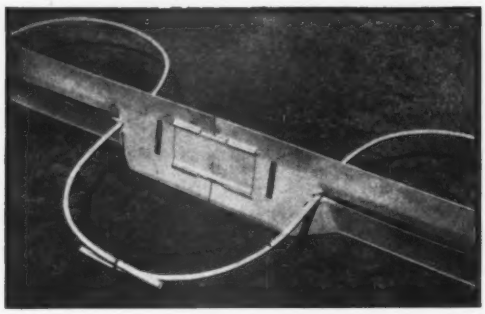

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ENGINEERING NEWS-RECORD

October 4, 1934

AT BROWNSVILLE, TEXAS, the Rio Grande when in flood abandons the meandering channel here shown and spreads over much of the rich farmland.

Mexico and United States Join in Border Flood Control

By L. M. Lawson

Commissioner, American Section, International Boundary Commission El Paso, Texas.

FLOOD CONTROL and river rectification operations at points on the boundary line between the United States and Mexico that have been seriously menaced in the past by uncontrolled floodwater are now being carried out by the International Boundary Commission, a body of engineers organized in two parts, the United States section and the Mexican section. The projects now being undertaken in the El Paso-Juarez Valley below El Paso, Texas; in the Lower Rio Grande Valley above Brownsville, Texas, and Matamoras, Mexico; at Nogales, Arizona, and Nogales, Sonora, have been necessary for many years, since the time that these areas became highly cultivated agricultural lands and valuable urban property. Due to the international nature of these flood problems, it has devolved upon the International Boundary Commission to formulate practical steps in these first joint constructive efforts between the two countries to remove the menace of floods along the boundary.

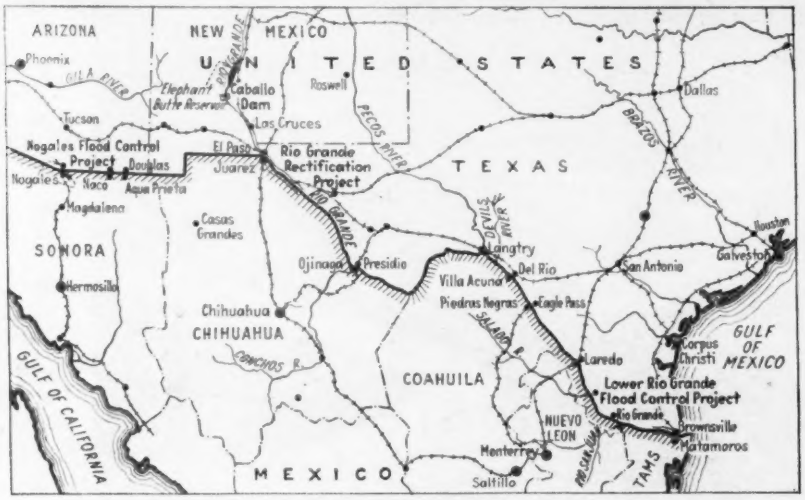
Construction work has been initiated by allotment of funds by the Public Works Administration after preliminary negotiations with Mexico had culminated in suitable conventions and agreements. The total estimated cost for completion of the projects now being executed is over $12,600,000. Administration of the works is carried on from the offices of the International Boundary Commission at El Paso, Texas, and Juarez, Mexico. The American Section maintains project offices at Nogales, Arizona, and San Benito, Texas, for the purposes of supervision and field administration of the parts of these works in the United States.

The American Section is executing the work of the projects with the use of American labor and the purchase of American equipment and supplies, and, correspondingly, Mexico is making use of Mexican labor and Mexican equipment and supplies. Throughout the work both sections are cooperating closely in matters of engineering plans and construction operations.

Rio Grande rectification

The plan for the rectification of the Rio Grande in the El Paso-Juarez Valley was provided for in a convention be-

tween the United States and Mexico dated Feb. 1, 1933, and the amount of $3,300,000 has been allotted by the Public Works Administration for its prosecution. The convention provided a means to remove the flood menace from this valley and to stabilize the international boundary line. This is to be accomplished by the construction of a rectified river channel from El Paso-Juarez to the mouth of the box canyon below Fort Quitman, and the construction of a flood-control dam (Caballo Dam) and reservoir, on the Rio Grande, about 100 miles north of El Paso, Texas.



THREE FLOOD-CONTROL PROJECTS are under way along the Mexican border; north of the border, Caballo Dam is being built to hold back floodwaters.

In determining the proper and justifiable proration of costs between the two countries, the commission took into consideration the benefits that each country would receive according to the areas and their values to be protected. On the United States side of the valley there are about 70,000 acres of land served with irrigation and drainage works and first-class roads, representing a total agricultural investment estimated at $17,600,000, or 34,000,000 gold pesos. On the Mexican side there are approximately 35,000 acres of land under cultivation. Practically no drainage works have been constructed, and the existing irrigation works are largely insufficient. The value of agricultural improvements on the Mexican side was estimated at 5,400,000 gold pesos. Comparing these agricultural values in one part of the valley with those in the other it is seen that the Mexican side represents 13 per cent of the total and the American 87 per cent. Since the cities of El Paso and Juarez not only are included in the flood-protection plan but either directly or indirectly would receive a large part of the benefits of the rectification of the river channel, consideration was given to the proration of values which each city bears to the other, and by giving proper weight to the various percentages it was determined that the justifiable proration should be 12 per cent for Mexico and 88 per cent for the United States.

River rectification will provide a rectified river and floodwater channel for a distance of 88 miles, the present river distance over this terrain being about 155 miles. The channel will be formed by the construction of parallel levees, generally 180 meters (590 ft.) apart. Where practicable the existing river will form the low-water channel. The rectification features will involve the acquisition of about 15,000 acres of rights-of-way and segregated tracts, the handling of 4,775,000 cu.yd. of excavation and 8,985,000 cu.yd. of embankment, and the construction, enlargement, extension or re-establishment of irrigation works and structures where made necessary by the relocation of the present river channel.

Caballo Dam will form a flood-control reservoir of 100,000-acre-ft. capacity designed to control all floodwaters originating above the dam, including the probable spill over the dam of Elephant Butte Reservoir. The dam proper is to be a rolled filled embankment about 1,200 ft. in length and 62 ft. in height at the maximum section. Percolation is to be reduced by a compacted clay core carried into the underlying cemented conglomerate. The upstream face is to be constructed on a three to one slope and protected by a 30-in. gravel blanket. The freeboard above the maximum water surface is 8 ft. exclusive of a 5-ft. concrete wave-breaker wall to be constructed the entire length of the embankment. The top width will be 25 ft., the downstream 5 ft. of which will be gravel and conglomerate fill. The downstream slope of the earth section proper will be constructed on a two to one slope, while the exposed downstream face will be on a three to one slope for the upper 48.5 ft. and five to one below that point, that portion of the embankment between the earth section and the exposed face being a gravel and conglomerate fill. A concrete spillway chute of 33,000-sec.-ft. capacity, 900 ft. long, and varying in width from about 130 to 170 ft., is to be constructed in a cut to be made through an existing hill on the east bank of the Rio Grande, into which hill the embankment will be constructed.

The construction of the dam and reservoir will involve the acquisition of about 7,040 acres of privately owned land; the handling of about 465,000 cu. yd. of excavation; the placing of 404,000 cu.yd. of embankment and gravel blanket, 3,000,000 lb. of metal work and 22,200 cu.yd. of concrete.

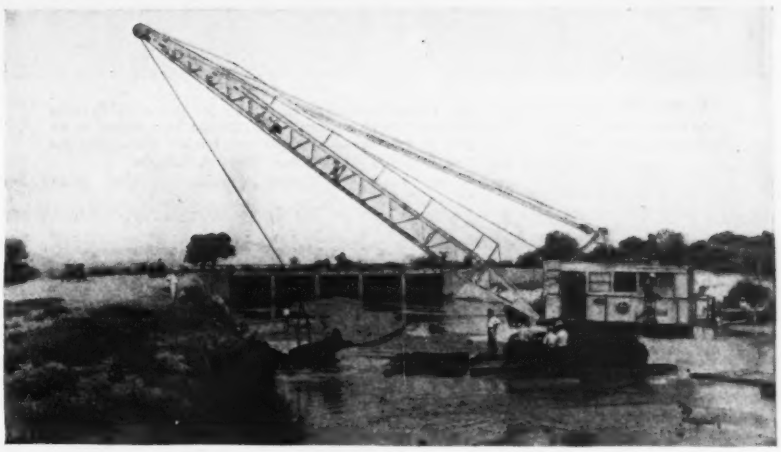
After rectification of the Rio Grande the permanent international boundary will be the middle of the deepest channel of the river within the rectified area. The rectified channel is to be centered upon an axis located so that the areas thus segregated from each country are equal. Each government will acquire full title and ownership of all the required lands in its own territory at the present time and will exchange with the other one-half of the area required for rights-of-way and the total area for segregation.

Field engineering work began on Jan. 3, 1934, and the field engineering force has been gradually enlarged in making the necessary surveys and supervising contract work of the rectification feature and on Caballo Dam. Field offices are maintained at Ysleta and Fort Hancock, Texas.

The field and office work of the project is closely coordinated to the end that the actual accomplishment of the construction program might proceed in an orderly and efficient manner. In the field the work has principally consisted of the establishment and monumenting of right-of-way lines, the establishment and referencing of the United States levee, the Mexican levee, the river channel center-line locations, and the taking of profile and cross-section elevations along such lines. Test pits have been dug in the rectified channel right-of-way in connection with the engineering investigations of the commission and for the benefit of prospective bidders.

Office engineering work included the preparation of the balanced area study and the projection of the final locations of the axis line, channel line, levee and right-of-way lines. Extensive detail computations based upon, and prepared from, the surveys and maps of the commission were also necessary in order to prepare, for each separate parcel of land to be acquired, a plat, metes and bounds description, and land classification table. Hydraulic studies to determine the final elevations of the tops of the proposed levees were made, and profile drawings of the United States levee, of the center of the new channel and of the Mexican levee in the various sections of the proposed channel were prepared.

ALONG THE LOWER RIVER new and higher levees are being built up to confine the river to its own channel or to established floodways.



BELOW EL PASO work has been begun on a project to straighten the channel and to hold the river to the new alignment by the construction of levees.

A land purchase office has been established for the acquisition of rights-of-way and segregated tracts, and it has acquired a large portion of the lands necessary for the completion of the project. Its activities have been considerably aided by the use of airplane photographs upon which the proposed channel has been laid out, thus facilitating the purchase of improvements and serving as a check on calculations from the ground.

Eight construction contracts have been awarded, six for clearing and grubbing, and two for drilling foundation test holes. Four of the clearing contracts have been completed, one is under construction, and one has just been awarded. Invitations have been recently released for excavation and embankment work involving the handling of 2,945,475 cu.yd. of earth. Two dragline excavators have been purchased by the commission and are at work on the project at emergency locations.

Lower Rio Grande flood control

The Public Works Administration has allotted $2,000,000 for the beginning of the Lower Rio Grande flood-control project. The plan for such flood-control works had been considered in negotiations of the United States and Mexico, which culminated in each government's acceptance of the joint plan on Oct. 3, 1932.

In general the project involves surveys, repairs, improvements and general overhauling work on the Rio Grande levee system and floodways located on the United States side of the river between Rio Grande City and the Gulf of Mexico. Some of these floodway features were constructed by the counties of Hidalgo and Cameron, in Texas, but due to lack of funds the construction work has not been entirely completed and only such maintenance work has been done as was considered absolutely necessary.

The capacity of the channel of the Rio Grande from a point above Brownsville to the Gulf is limited to 30,000 sec.-ft., while floodwaters originating sometimes 100 miles above Brownsville have carried a peak of 200,000 sec.-ft. Consequently it has been necessary, through international agreement, to provide floodways for the diversion of floods so that the surplus waters may reach the Gulf without damage to property in this heavily irrigated and rich section.

The complete project contemplates: (*a*) raising and strengthening of about 300 miles of river and floodway levees; (*b*) clearing and grubbing of about 150 miles of floodways; (*c*) improvement of the floodways by the removal of obstructions, and in certain instances, by the rectification of the floodway channel; (*d*) construction of certain protective works to prevent flood damage to important irrigation structures crossing the floodways, and to prevent the loss of existing river levees with the resulting flooding of lands that such levees were intended to protect from the cutting, caving and shifting of the present river banks; and (*e*) building of control structures designed either to control the distribution of floodwaters between the floodways, or to prevent, during periods of medium high flows, the deposition of silt at floodway entrances.

The project has been separated into two field divisions with the Hidalgo-Cameron county line as the dividing line. Sub-headquarters are located at McAllen and San Benito respectively for the two divisions.

Rights-of-way necessary for the accomplishment of the project are to be provided by the counties in which construction work is to take place, without cost to the government

The first construction began in December, 1933, both by direct administration and by contract. At the end of June, 1934, expenditures were being made at the rate of about $150,000 a month, 1,800 workers were directly employed on construction work, and a total of $592,385 of the allotment had been expended. Up to that time about 20 miles of river and floodway levees had been raised and strengthened or constructed, involving the handling of about 600,000 cu.yd. of earth; revetment works protecting about 6,000 lin.-ft. of cutting river bank had been installed; an area of about 4,000 acres of floodway and floodway levees had been cleared and grubbed of vegetation and brush; numerous drainage structures under strengthened levees had been extended and new structures provided under newly constructed levees; a concrete and steel protection structure designed to

FLOODWATERS that have done extensive damage in the border towns of Nogales now are being confined to a permanent flood channel. The section here shown is on the American side where the open section passes into the box section that forms the channel under streets of Nogales, Arizona and Nogales, Sonora.

prevent the destruction by erosion of a large irrigation siphon crossing under one of the floodway channels had been completed; 56,000 cu.yd. of excavation had been removed from the entrance to one of the floodways; work had started on other protection and control structures, and plans and specifications for additional units of floodway clearing, for levee building, levee strengthening and floodway channel rectification were in the course of preparation. The present construction work on the project will strengthen the flood-control system at the most vulnerable points and will bring about partial improvement in the operating efficiency of the entire system.

Nogales flood-control project

A serious flood situation created by arroyos in the vicinity of Nogales, Arizona, over a period of years has been increasing as a menace to the life and property both in that city and in Nogales, Sonora (Mexico), important ports of entry on the international boundary. Although each city from time to time had adopted emergency precautions to combat the flood danger, it was impossible for either, acting independently, to provide proper remedial measures, because of their topographical interdependence resulting from the natural conditions of the neighboring terrain. Consequently, the subject was referred to the International Boundary Commission for study.

Late last year $433,000 was allotted by the PWA for the construction of flood-control works in accordance with plans prepared by the commission and agreed to by the two governments involved. The main feature of construction in the United States consists of about one mile of floodwater conduit, beginning at the international boundary and extending northward through the heart of the business district of Nogales, Arizona. For about 80 per cent of its length the conduit is to be a reinforced-concrete box 20 ft. wide and from 11 to 18 ft. high, the top of the box replacing the street paving removed during construction. The remaining 20 per cent will be constructed as a concrete-lined open channel, spanned at its one street crossing by a 42-ft. reinforced-concrete bridge.

A project headquarters, established at Nogales subsequent to the authorization of the project, commenced the work of relocating the various public utility service lines to make way for the proposed construction. This work was accomplished under the supervision of the project office by labor furnished the city of Nogales by the Civil Works Administration. The field force supervised the work of the construction contractor by checking the proportioning of the concrete mixes and inspecting its placing. It also established all necessary lines and grades for the contractor.

Office engineering work was carried on in El Paso where final detail working drawings and reinforcing schedules were undertaken. Detail drawings showing the location, profiles and construction details of the closed section of the conduit, the construction details of the proposed bridge over the open section of the conduit, and other structures incidental to the main feature of the project also were completed, checked and traced there.

Excavation was started by the contractor on March 19, 1934, and the first concrete was placed in April. During the quarter ended June 30, 1934, excavation for the lower 2,500 lin.-ft. of the conduit was completed, as was 1,000 ft. of the concrete-lined open channel and 600 ft. of the concrete box section at the lower end of the project. An additional 350 ft. of the box section was partially completed. Actual construction employs 220 men.

Hydrographic work

In order to appraise intelligently the water resources of the Rio Grande, the International Boundary Commission early realized that it was essential to know certain characteristics of the stream and its tributaries such as the quantity of water, its suitableness for various uses, the available storage and the important factors of loss of storage capacity by water-borne sediment and loss of stored water by evaporation. To this end, the commission organized suitable agencies for the acquisition of pertinent data. The American Section operates thirteen regular gaging stations on the main river and fourteen regular stations on tributaries with in the United States as they enter the Rio Grande; the Mexican Section operates two regular stations on the main river and six on Mexican tributaries. The objectives of stream-gaging work are to determine the quantity and source of the flow of the river, to ascertain from the records values which will represent normal flows and extreme flows at pertinent points, and to develop a unity in the methods and equipment used by the two sections of the commission.

Hydrographic work consists of gathering and publishing records of streamflows; making special reports on unusual flood conditions; cooperating with representatives of the states interested in the flow of the international rivers; analyzing water samples to establish their characteristics regarding use for irrigation and other purposes; appraising and publishing facts concerning the loss by evaporation of stored water; gathering and publishing information of the amounts of water held in storage in the reservoirs in both countries.

Following the disastrous flood of 1932, the commission organized an agency for the collection, preparation and dissemination of flood warnings along the Rio Grande. This agency will function at times of large and dangerous floods, and it will make possible the protection of lives and properties in the towns and populated valleys below El Paso from high water.

Irrigation investigations

Hydrographic activities are, in addition, concerned with the investigation of the disposition of the waters of the boundary rivers. A large part of the water of the Rio Grande over and above that diverted for irrigation of lands in the United States flows unused to the Gulf of Mexico. Diversions for irrigation are measured by the gaging stations aforementioned. Records are maintained of the amounts diverted for municipal use as well as for irrigation, with the result that 98 per cent of the disposition of the Rio Grande flow is accounted for.

In addition, chemical analyses are made of the suitability of the waters for agricultural purposes.

Personnel

The American Section of the International Boundary Commission has set up separate organizations for more immediate planning and control of the actual construction programs of the projects under its supervision. The section has on the Rio Grande rectification project a total of 241 employees, of which 43 are engineers and engineering assistants. There are employed by the section on the Lower Rio Grande flood-control project 1,168 persons, the number of engineers and assistants being 70. At Nogales, Arizona, 228 men are employed on the project and, of these, six are engineers.

J. L. Lytel is project engineer in charge of the Lower Rio Grande flood-control project. S. F. Crecelius is in charge of the Nogales flood-control project. C. M. Ainsworth is in charge of the Rio Grande rectification project at El Paso. Engineering consultants and technical advisers to the American Section are W. E. Anderson, E. N. Noyes, J. B. Lippincott, Louis C. Hill and Vic H. Housholder.

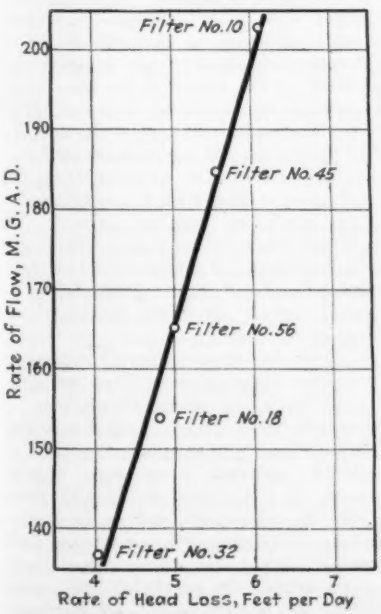
New Index Recommended for Filter Efficiency

Quantity filtered per foot of head loss, which takes into account different operating conditions, is more logical index to use in making comparisons than is duration of filter run

By Roberts Hulbert and Douglas Feben
Senior Chemists, Department of Water Supply, Detroit, Mich.

WHEN making comparisons of the performance of rapid sand filters that operate under somewhat different conditions, the logical index to use is the quantity of water filtered per foot of head loss rather than the duration of the filter run. The evidence for this is contained in the results of a series of trial runs at the Water Works Park filtration plant at Detroit, Mich., which show the rate at which filter loss of head increases to be directly proportional to the rate of filtration.

TEST RUNS of five closely similar filters at the Detroit filter plant show that rate of head loss is directly proportional to rate of filtration.



The experiment was carried out as follows: the records for a few preceding years of the eighty filters were examined, and five filters were chosen that had given consistently parallel runs. These filters were carefully examined, and the controlling mechanisms and gages were overhauled and checked. The filters were then placed in service, each at a different rate of flow, the rates ranging from 140 to 200 m.g.d. per acre, and were maintained at their respective rates for an entire month, except for the necessary washing. Hourly loss-of-head readings were taken and recorded. The rate of flow for each filter was checked weekly and changed at the end of a month, when a new series was started. In all, five series were completed.

As these filters were included in general plant operation, and several factors beyond the control of the experimenters entered into some of the results, only two of the series gave figures that were comparable and capable of interpretation. The results from one series are shown in the accompanying curve, in which the rate of filtration is plotted against the rate of head loss. The graph shows unmistakably a direct proportion.

Since the beginning of rapid sand filtration, the filter plant operator has been prone to judge the efficiency of a filter bed by the length of its run. Properly, however, comparisons based on filter runs should be confined to the results from a single filter unit, or at the most should be made only between units known to be identical in every respect, because this criterion is neither fair nor valid when used to judge efficiency of different filters or those in different plants. This is true, first, because few filters have the same available head to work on and, second, the rate of filtration varies from plant to plant.

The available head can be defined as the operating head minus the sum of the initial filter loss and the loss through a wide-open controller at the set rate of the filter, or it may be defined more broadly as that part of the operating head available for the production of filtered water at a required constant rate of flow. Naturally the amount of available head would not be the same for all plants even if operating heads were the same; e.g., different makes and sizes of rate-of-flow controllers have varying frictional losses and thereby account for corresponding varying losses in operating head at the discharge end. Moreover, sands of varying sizes and depths, as well as different rates of flow, are responsible for differences in the initial head loss.

Rates of flow vary in different plants and may vary in any one plant from season to season, or even from day to day. Variation in the length of the filter run, as a result of changes in the rate of flow, is due to a factor artificially imposed and not inherent in the filter bed.

The proportion between rate of filtration and clogging rate can be expressed:

Filtration rate $= m \times$ clogging rate.

In this expression, the constant m is the only quantity that is the same for all the filters under test. It, therefore, satisfies the requirement for a proper criterion of filter performance: that filters having identical depth, size and grading of sand, and supplied with the same water, give the same value for the index, regardless of rate of filtration or available head.

This index can be expressed

$$m = \frac{\text{rate of filtration (m.g.d. per acre)}}{\text{rate of head loss (ft. per day)}}$$

or $m =$ m.g. per acre per foot of head loss.

To demonstrate the difference in the evaluation of filter efficiency by the two methods, the accompanying table has been compiled.

On the basis of length of filter run, filter A would appear to be superior in efficiency to filter B, but by using the index of "million gallons per acre per foot loss of head" their positions are reversed.

TWO METHODS OF EVALUATING FILTER EFFICIENCY

	Rate of Flow, m.g.d. per Acre	Initial Loss of Head, Ft.	Final Loss of Head, Ft.	Available Head, Ft.	Filter Run, Hours	Million Gallons Per Acre per Foot Loss of Head
Filter A	120	0.75	9.75	9	54	30
Filter B	140	1.25	8.25	7	42	35

Changed Elevated Tank Design Required For Safety Against Earthquakes

Preliminary results of model studies at M.I.T. indicate necessity for a dynamic approach to the design of these limber, top-heavy structures—The problem stated and the investigation described

By A. L. Brown,
Director Factory Mutual Laboratories, Boston, Mass.

ACCURATE engineering data regarding the stresses set up in elevated water tanks by earthquake motions are so lacking that there is considerable uncertainty regarding the best methods of designing elevated tank structures and of strengthening existing structures to resist earthquakes. Dependable knowledge of the behavior of tanks and of the earth motions during severe earthquakes is needed in place of much present opinion and conjecture. The Associated Factory Mutual Fire Insurance Companies and the Freeman Engineering Corp. (established by the late John R. Freeman) are cooperating to increase the available knowledge of the behavior of elevated tanks during earthquakes by an investigation now being carried on through the division of industrial cooperation of the Massachusetts Institute of Technology, where the work is in direct charge of Arthur C. Ruge, research associate in seismology in the department of civil and sanitary engineering. The immediate objects of this work are as follows:

(1) To determine the characteristic behavior of an elevated tank tower when subjected to ground motions of various periods and amplitudes such as might occur in an actual earthquake.

(2) To find how the motion of the water in an elevated tank affects the stresses that are set up in the tower by an earthquake.

(3) To determine what relation, if any, exists between the stresses actually produced by an earthquake and the stresses calculated by the commonly accepted methods of anti-seismic design.

At first glance the design of an earthquake-resistant elevated water tank seems to be an extremely simple engineering problem in comparison with a more complicated structure such as a building. However, it is evident that a relatively limber, top-heavy structure like an elevated tank will not behave dynamically like a rigid building such as competent engineers confidently design to resist earthquakes. Furthermore, the treatment of earthquake-resistant designs from the standpoint of dynamics has in the past been superficial, the tendency having been to simplify design methods on the basis of intuition or practical experience without attempting a rigorous analysis; and elevated tank designs, to cope with earthquakes, must be based on dynamic and not static behavior.

Earthquakes manifest themselves as irresistible motions rather than forces. The expression "earthquake force" has become so widely used that many engineers see the problem of quake-proof design as one of simple stress analysis in which these "forces" are definitely determined by the violence of the earthquake. On the contrary, the forces produced by the earthquake motion depend primarily upon the characteristics of the structure subjected to the motion.

With the irresistible movements of an earthquake, there are associated various frequencies, or periods, and, although the actual motion may be highly irregular, certain dominant periods often appear. It is upon the similarity between the natural period of vibration of a structure and the various periods appearing in the earthquake that the amount of damage to the structure largely depends.

If a structure is acted upon by a ground motion of a period five or six times that of the structure, it is possible to compute the stresses with fair accuracy on the basis of the acceleration of the ground motion. In this case, the forces acting upon the structure are taken as the product of the various masses into the ground acceleration. This simple rule, although in common use, cannot correctly be extended to structures like elevated water tanks, which usually have natural periods of the same order as those commonly associated with major earthquakes. Additional difficulty is introduced by the dynamic behavior of an elevated tank, which is not amenable to any simple mathematical analysis because of the complication introduced by the action of the large mass of water in the tank.

The behavior of a water tank supported on a steel tower is controlled by two kinds of physical forces: (1) gravity, or weight forces, which affect the motion of the water within the tank; and (2) elastic forces, produced by the tower, which affect the motion of the tank as a whole.

These two kinds of forces interact in a very complex manner when the tower is subjected to vibratory motion. In constructing a model of such a system, it is necessary to maintain the same relations between these two physical forces in the model as in the prototype, if true similarity is to be obtained. The necessity for scaling down gravity forces and elastic forces in the same proportion precludes the possibility of using simple geometrically

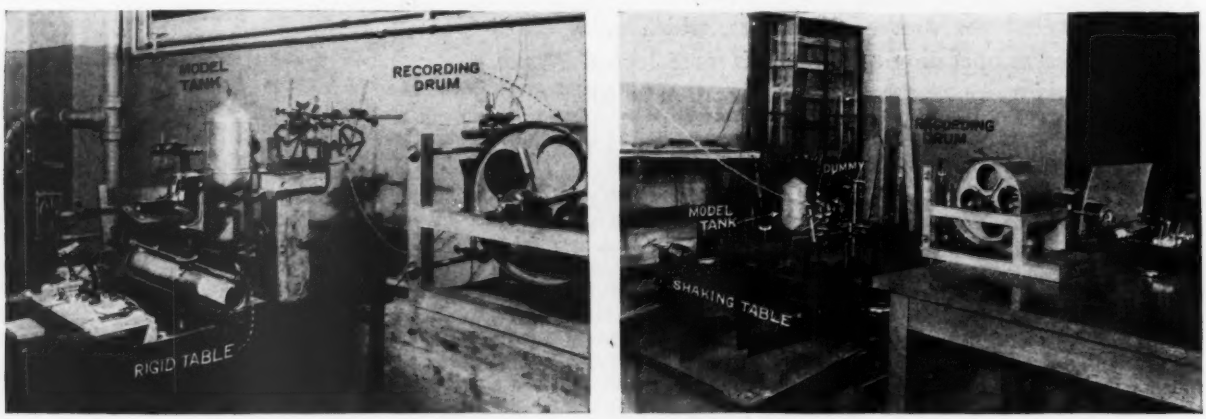


FIG. 1—TEST APPARATUS for subjecting model elevated tank to movements simulating those of an earthquake. Set-up for free vibration tests at left and for shaking-table tests at right.

scaled models, and it becomes necessary to employ the common artifice of model technique—scale distortion. In the project to which this article relates, a great deal of the work was devoted to the development of an adequate and relatively simple laboratory technique. Space allotted to this article does not permit more than an outline of a few of the important factors.

Some basic concepts of tank model testing

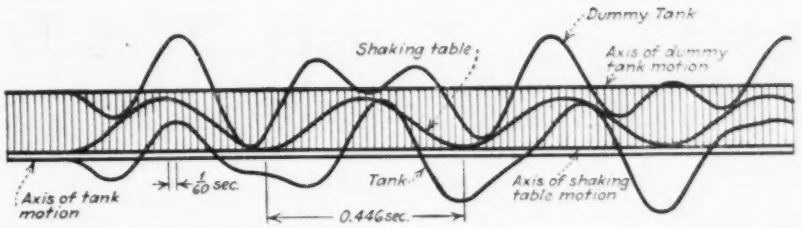
In considering the relation of the tank to the tower in any vibratory movement, the basic conception is that the tower merely provides an elasic force which is proportional to the deflection of the tank and which tends to restore a condition of static equilibrium. In designing a model it is advantageous to make use of this fundamental fact in order to obtain simplicity in construction and to avoid costly or complicated models which might be of doubtful accuracy.

It must be borne in mind that the results of a model study based upon these considerations must be interpreted as valid for the prototype only up to the point where the elastic limit for the prototype is reached. It is neither practical nor very useful to attempt to duplicate ultimate strength conditions in a model.

When a vibratory motion is applied to the support of a system, the system itself will, in general, begin to vibrate. In the early stages of its vibration the motion of the system does not bear a simple relation to that given to the support. During this interval, the resulting motion is made up of two parts: "free" or transient vibrations; and "forced" or steady-state vibrations. If the system be initially at rest when the disturbing motion begins, free vibration will always exist during the early part of the motion. These transients may cause the motions of the forced system to be more than twice as great as those which will eventually exist in the steady state.

Since earthquake motions are certainly not sustained vibrations, it is obvious that interest lies principally in the transient behavior and not the steady state response of the system. As a matter of fact the presence of the transients may cause very high stresses within the duration of the first one or two cycles of the disturbing motion. For this reason, it is not necessary that an earthquake have a long series of equal-period motions in order to produce large stresses in an engineering structure.

The selection of an artificial earthquake motion requires careful study. It is a well-established fact that any arbitrary irregular motion can be resolved into a series of component simple harmonic motions. With this in mind, it should be clear that the information derived from a series of simple harmonic motion tests is sufficient, theoretically at least, to determine the behavior of a system under an arbitrary type of ground motion. This being so, simple harmonic motion can be regarded as a reliable measuring stick to be used in determining the ability of a system to resist earthquakes.



Magnification of Motions

Shaking Table	13.8	Dummy Tank	24.4
Tank	24.1	Table Period	0.446 sec.

FIG. 2—PHOTOGRAPHIC record of motion of tank, dummy tank (water represented by a solid) and shaking-table.

Duplicating earthquake motions and periods

There was no thought that the experimental work in this study could, in the early stages at least, attempt to show the actual behavior of a tank when subjected to the complicated and uncertain movements of an earthquake. Much would be learned if the behavior under a relatively simple movement in one direction only could be definitely determined. The models were constructed and the vibration tests carried out on this basis.

In a laboratory, a motion of cosine form is perhaps the simplest to produce. Also, this form of motion begins with its maximum acceleration and is undoubtedly similar in character to that of some earthquake motions. Over the range of periods which produce the most dangerous stresses, it makes little difference whether sine motion or cosine motion is adopted. If the object under consideration is on the border line between safety and unsafety, it would be desirable to make tests using more than one kind of motion, but in this work with elevated tanks it became clear that refinements in motion would be of academic interest only.

The range of periods chosen covered the generally accepted destructive band of earthquake frequencies, although there is a great deal yet to be learned about the upper and lower limits of earthquake periods. The selection of periods from ¾ sec. to 1½ sec. as "destructive" is apparently based largely on the behavior of buildings, the actual periods of which often fall close to that range. It is not to be assumed, however, that large ground motions of much longer periods do not exist during severe earthquakes; and it is certain that there are much shorter periods present. The long periods have not been recorded successfully, largely because the ordinary types of instruments are not suited for recording such motions.

It was considered important to compare the behavior of the actual tank and water with that of an equivalent entirely non-fluid mass in order to determine the effect of the water upon the motion. Consequently, in addition to a model water tank, a "dummy tank" was constructed, to show the behavior if the water were replaced with a solid mass of equal weight.

The dummy tank, which was merely an inverted pendulum, also served another important purpose, namely, to control the accuracy of the laboratory work. The calculations of the theoretical motion of a pendulum being a simple matter, it was possible to check the correctness of the work at any time. As the dummy pendulum or tank and the actual tank model were always tested simultaneously, it is safe to assume that if the theoretical dummy motion checked the recorded motion satisfactorily the motion of the actual tank model would also be correct. The "prototype" of the tank model was an actual 60,000-gal. tank on a 100-ft. tower at Los Angeles, Calif.

Two types of tests made on tank model

The laboratory work was divided into two main parts: (1) free vibration tests and (2) shaking-table tests. In the free vibration tests the model was mounted upon a rigid, stationary support, and the movements obtained by suddenly releasing the model from a pulled-back position. Two periods stood out quite distinctly. These are related to the periods of the tank and contents moving as a single mass and to the fundamental period of the water within the tank.

In the shaking-table tests the heavily weighted table was pulled back against springs and then released suddenly. The table was suspended by wires in such a way as to limit its movement to one direction and to avoid frictional damping.

All movements of the tank and dummy tank with respect to the shaking table, and the movement of the shaking table itself, were recorded photographically together with time intervals produced by an electric spark. With this arrangement absolute uniformity in the motion of the drum carrying the photographic paper was not important. The equipment and model set-up for both types of tests are shown in Fig. 1.

A large number of shaking-table tests were made, using different periods, different acceleration and the consequent different amplitudes. In analyzing the results of these tests in which transient

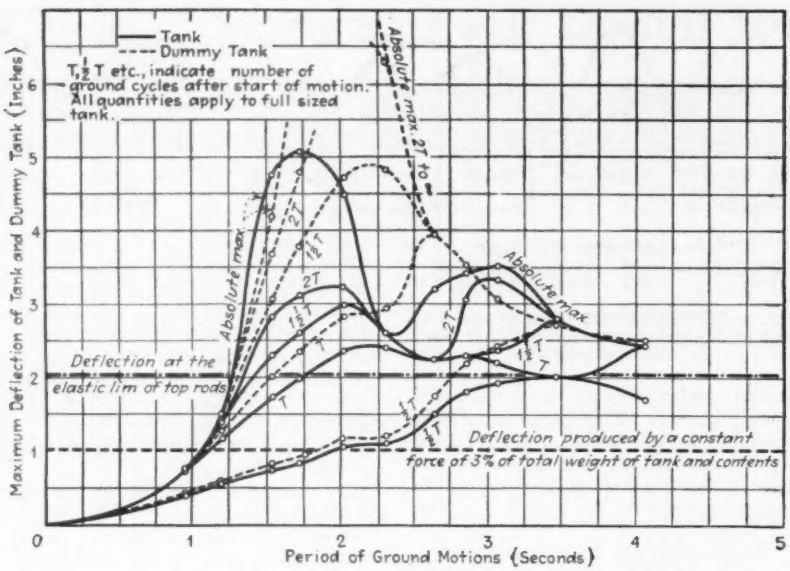

Tank
Dummy Tank
T, ½ T etc., indicate number of ground cycles after start of motion. All quantities apply to full sized tank.
Absolute max. 2T to ½T
Absolute max.
Absolute max.
Deflection at the elastic lim of top rods
Deflection produced by a constant force of 3% of total weight of tank and contents
Maximum Deflection of Tank and Dummy Tank (Inches)
Period of Ground Motions (Seconds)
0
1
2
3
4
5
6

FIG. 3—TANK DEFLECTIONS produced in tests by simple harmonic ground motion of different periods having a maximum acceleration of 3 per cent of gravity. The deflection produced by a constant force of 3 per cent of the total weight of tank and contents is shown for comparison.

as well as forced vibrations are important, the duration of the motion was taken into consideration.

The accompanying reproduction of a section of one of the photographic records of a shaking-table test (Fig. 2) indicates the clearness with which the records were produced and the large magnification of both time and motion, which facilitated greatly the analysis of the results. Particular attention is directed to the open character of the records and the time scale, which is many times that used in actual earthquake-recording equipment.

The model tests showed that within wide limits, for any one ground period, the deflection of the tank is proportional to the maximum amplitude of the ground motion. Comparison of the actual deflection of the tank with the deflection that would result from the application of a force equal to the product of the mass of the tank and water and the maximum ground acceleration occurring with the ground motion used, shows definitely that the present method of assuming a static application of force is considerably on the unsafe side.

As illustrating this, the data obtained in one series of tests are shown plotted in Fig. 3 for a maximum ground acceleration of 3 per cent of that due to gravity. The maximum deflections of the tank and the dummy tank are shown in relation to the duration of the ground movement expressed in terms of ground cycles. (Data are plotted for the full-size tank.)

The plot also shows the displacement of the tank occurring as the result of the application of static force equivalent to 3 per cent of gravity at the tank. It will be seen that even with this conservative acceleration, deflections which would have been destructive in the actual tank are reached even before the end of two complete ground cycles and often well within one cycle.

Comparison of the motion of the actual tank and the dummy tank shows that the amplitude of the motion of the actual tank is somewhat less than it would be were the mass of water solid.

It is evident from the study so far made that moderate strengthening of a tank tower may have no beneficial effect on its earthquake resistance unless the rigidity can be increased to give a natural period of not more than one-tenth of that of the usual tank structure, which may be from 1 to 3 seconds.

It appears to be a logical conclusion, therefore, that an economical solution to the problem of designing quake-proof tank towers will require a departure from present design. The research at the Massachusetts Institute of Technology is being continued, and all available field data on actual earthquake movements and effects are being used to supplement the model tests. Interested organizations and the U. S. Coast & Geodetic Survey are actively cooperating in order that the conclusions will be based upon all available technical data and actual experience, and will serve as a dependable guide in the design of new elevated tank structures and in improving the strength of those already in service.

CWA Offers a Lesson in Accident Prevention

Quickly organized safety program overcame condition of green workmen under green supervision on thousands of jobs and kept deaths to 0.29 per million hours

By Curtis Billings
National Safety Council, Chicago, Ill.

OF THE MAJOR INDUSTRIES in the United States, construction has, except for one, the worst fatal-accident experience. At least ten workers were killed in 1933 for every 10,000 employed.

Far from being alarmed by this situation, the industry as a whole has received such news year after year with composure. The reason for this apparent apathy is not that contractors and engineers are less humanitarian in their social attitude than other employers or that they would not like to see their sky-high insurance rates reduced. The reason for their seeming indifference is that they have not been convinced as yet that accidents can be prevented without a serious sacrifice of efficiency and economy. Certain it is that they do not know that safe operations are both *more* efficient and *more* economical than unsafe operations, a fact which has long been accepted as axiomatic in most industries.

CWA presents proof

Proof that accidents can be reduced in construction work is found in isolated instances where employers were determined to reduce them. For large-scale operations, however, the best proof can be found in the records of the CWA from Nov. 15, 1933, to April 30, 1934. In fact, a valuable byproduct of the gigantic enterprise was the demonstration that even under very bad conditions accidents are by no means inevitable.

As I write this I can see the lips of several hard-headed and able construction men curl with something akin to contempt at the reference to construction work under CWA; but the reasons for the fact that CWA projects did not "get done" with the dispatch of private

operations are reasons that make the argument all the stronger. If accidents could be prevented among four million green hands working under green supervision on all manner of hastily conceived jobs in every state in the Union, I submit that accidents can be prevented anywhere.

Accidents forecast

Soon after the work-relief program was begun, an estimate was prepared of the toll which accidents would exact in the course of the CWA. The actuaries used the frequency and severity rates for accidents on construction and other work as they were obtainable from insurance companies, state industrial commissions and the National Safety Council. Even with these data the task was no sinecure; for in industry men are, for the most part, fitted to their jobs; they are experienced, and their supervision is adequate. Not so on the civil-works projects.

The estimate that was made proved to be far too pessimistic; the deaths that occurred before Jan. 1 (when the safety program started) were not nearly so numerous as had been calculated. Chance may have been on the side of the CWA, however, because luck and luck alone often decides whether an accident is to result in a fatality or in a mere flesh wound. The estimated death toll was 960. One hundred lost-time accidents were to occur for each million hours of work. The total compensation cost was to be $20,000,000. By Jan. 1, however, only 125 fatal accidents had occurred, while 26 per cent of the total man-hours had been worked. Thus we shall gage the effectiveness of the safety program not by comparing the fatality frequency rate after Jan. 1 with the estimate but with the actual rate prior to Jan. 1.

Mr. Hopkins was handed the estimates early in December. It is not surprising that he was unwilling to let such a loss take place without making an effort to hold it down. Surely anybody with any business acumen would be loath to stand by and see $20,000,000—much needed for the work at hand—slip away. It was a sum sufficient to employ 80,000 men for the duration of the CWA.

Kinds of hazards

Most of the hazards, as they were reflected in the descriptions of accidents received at headquarters, were of the garden variety with which every contractor and engineer is only too familiar; but on these projects some unusual hazards existed also.

For example, it is by no means uncommon for housekeeping practices to be very lax on commercial jobs. Everyone has seen picks strewn about so that a workman could scarcely fall without being impaled with at least one pick point. That certainly is a common type of hazard. But even on private undertakings cursed with the most careless management, one would not be likely to see a group of deaf mutes assigned to digging a ditch through a swamp—especially when one of them had two wooden legs! That occurred on a CWA project. One might not be astonished to find on a private undertaking dump trucks and others ill-suited and dangerous for human cargo used for transporting men to and from work, but it would be a surprise to find two "lumber jacks" sitting one directly above the other in a tree complacently sawing off limbs.

The following hazards may be taken as fairly typical. On one large project men used a high railroad trestle in walking to and from work. The railroad company had granted permission to build a walk between the rails, but this was not done. Men, waiting for trucks at quitting time, overran busy highways with no guards to hold them back or flags or signs to warn motorists of their presence. One project called for removing the rust and painting a high bridge. Neither life preservers nor boats were available in case a man should fall into the water. Men swarmed about unguarded rock crushers, beneath undercut banks, in unshored ditches. They smoked in gassy sewer manholes; they blundered into poison ivy and oak; they didn't know a garter snake from a moccasin; first-aid stations were rare and ill equipped, and toilet facilities inadequate. Ignorant foremen considered safety "sissified" and first-aid silly.

The condition of the men was no better than the conditions under which they worked. Many of them were worse than green. Grown soft through long periods of inactivity, they were prone to overestimate their strength. One fell dead with heart disease during the first five minutes of his first job in three years. Some were underfed. In Detroit a worker quickly showed signs of serious weakness. He reluctantly admitted that he had eaten nothing but a small bag of ginger snaps in two days. Many were poorly clothed. In Illinois on one bitter cold January morning a worker, apparently ill with pneumonia, was ordered home for the day. "No, I'll be all right in a minute," he insisted. Removed to a warming station it was found that he wore no underclothes. Many of the men had been out of work so long they had forgotten the technique of group labor; most were employed at work they had never done before; literally millions had never heard of safety or given a thought to the prevention of accidents; and while some no doubt looked upon their jobs as a loafer's paradise, hundreds of thousands were so stimulated by the prospect of actually receiving a pay check again that they went at the work with more enthusiasm than caution, more will than wariness.

Safety campaign starts

Into this nationwide mess the safety program catapulted. Sidney J. Williams, of the staff of the National Safety Council, was loaned to the government as safety director of the CWA. He served throughout the duration of the enterprise. The immediate question was what to do first. On the day that Mr. Williams assumed his position, nine men were killed in a landslide on a highway project in the Colorado mountains. Hours, it was clear, were precious. There was no time for collecting and analyzing reports of accidents that had occurred, developing detailed rules or organizing a large field staff of safety inspectors. So pressure was resorted to, the same kind of pressure that puts a safety program across anywhere.

Telegrams were sent to every state administrator over the name of Mr. Hopkins, informing them in no uncertain terms that it was their responsibility to stop accidents to their employees. Some of the state administrators duplicated the telegram at once and sent it on to their district and county administrators. The telegram included more than a sharp command. It suggested that the state administrators follow the example of the federal administrator and appoint a state director of safety. Since there was no time to train these men, it was necessary to find experienced safety engineers wherever possible. Some of them were "borrowed" without pay from large insurance, public utility and industrial concerns. Others were hired outright. This corps included many of the ablest experts on the prevention of industrial accidents in the country. These men in turn employed field men and appointed regional, district and county safety directors. This staff comprised in all about 1,800 men, most of whom were experienced and all of whom were paid a modest salary. An effort also was made to designate as safety inspector at least one man on every job. These were CWA workers who were asked to spend part of their time looking for hazards to their fellows and reporting or eliminating them. There were close to 100,000 of these.

The local directors and in some places the state directors spent much time in the field inspecting projects, reminding the officials in charge of their responsibilities for the safety of their men, encouragng and instructing the safety inspectors on the jobs.

Examples of safety methods

As this organization was being thrown together throughout the country, a nine-point program was drafted by Mr. Williams, copies of which went to all safety men. It was brief—all contained on one sheet of paper—and included (1) the guarding of machinery, (2) maintenance of tools and machines in a safe condition, (3) proper selection and placement of men, (4) instruction of new men, (5) daily inspection of every job, (6) keeping green men away from special hazards, (7) safe driving

of trucks, (8) first aid, (9) weekly reports of all injuries and immediate telegraphic reports of all fatalities to headquarters at Washington.

This program was expanded and elaborated as time went on. Detailed bulletins were sent out giving instructions on certain types of hazards which accident reports revealed to be widely prevalent. A letter laying down definite but simple rules for the transportation of men by truck was an example. It was sent out after an epidemic of serious accidents. Similar bulletins giving instructions for shoring ditches, handling materals and for other common operations were issued—about twenty in all.

Safety posters in great numbers were used, some of which were prepared especially for CWA projects and others secured from the National Safety Council. In addition, in many places local safety men erected big safety signs in prominent places on the job.

Detailed information on the kinds of hazards causing the most accidents was issued weekly in mimeographed bulletin form from Washington. This information was gained from the statistical reports that were collected and tabulated.

On the initiative of the American Red Cross, first-aid training courses were established early in the safety campaign, and at least 70,000 men completed the special 15-hour course. This proved of tremendous value because it insured prompt and efficient first aid for thousands of injuries and eliminated many infections. Also the men who had taken the course became more aware of the causes of accidents and more interested in their prevention.

Misplacement of men

One of the greatest difficulties involved the inevitable misplacement of men on jobs for which they were woefully ill-fitted. Although choosing the man for the job is a refinement that many private employers neglect and one that would hardly be expected on such a quickly conceived enterprise as the CWA, a good start was made to eliminate the difficulty in some states, notably in Virginia. Here all employees were given a physical examination and placed in one of four catagories: (1) men fit to do any kind of work, (2) men able to perform any ordinary work but not work requiring unusual strength or agility, (3) men who were fit for special light work only, and (4) those who were not employable at all and had to be returned to the relief rolls. It may be said that less than 1 per cent of the applicants were placed in the last group and that less than 10 per cent were in group 3.

A number of men there were—and foremen too—who refused to cooperate with the safety men and continued to taken wanton chances with their lives and the lives of other workmen. At first it was exceedingly difficult to deal with the incorrigibles. Dismissed from a job, they would be promptly returned to the same job or to another one by the assignment office. But soon records of each man's service were kept and a worker once expelled from the service was not taken back again.

While instructions were sent out as well as informational bulletins, posters and statistical reports, the safety inspectors hurrying from job to job were the mainstays of the program. Many cases of near accidents were reported by them. One state safety director on a tour of inspection came upon four inexperienced young men working with pick and shovel beneath an overhang in a gravel pit. He called them to him to instruct them on the hazard, and as he talked to them there was a grinding roar and tons of material fell at the spot where they had been working.

From the south came a report on the removal of a rock ledge. Two out of three charges of dynamite went off on schedule, but the third did not. Deciding that this one was a "dud" the men began to return to the ledge and would have done so except for the commands of the safety men. Four hours later the "dud" went off.

A safety inspector ordered out of service a boat which he deemed unseaworthy. It was used to transport 60 men daily. Not long after in private service it capsized and sank in deep water.

Inspectors ordered workmen out of sewer ditches until they could be shored and away from banks that were not safely sloped. They withdrew from service such unsafe tools as axes, sledges, hammers with splintered handles and mushroomed heads, weak ladders and worn ropes.

The results speak for themselves. Table I shows the total deaths and the death frequency rate before and after Jan. 1. The drop in rate is a drop of 39 per cent, which is a fair index of the effectiveness of the safety program. Table II shows the deaths and injuries and the percentage distribution by causes. Note the discrepancy between the total deaths in the two tables; the total of 343 as given in Table I is the correct figure, this being from the later data. Seven deaths counted in June have been disallowed by the compensation commission because they were found to be not compensable.

TABLE I—COMPARISON OF FATALITY-FREQUENCY RATES ON CWA PROJECTS BEFORE AND AFTER SAFETY PROGRAM WAS ESTABLISHED

	To Jan. 1	Jan. 1-Mar. 31	Total
Man-hours	303,997,000	863,000,000	1,166,997,000
Fatalities	125	218	343
Fatality frequency rate	.41	.25	.29

TABLE II—LOST-TIME INJURIES AND DEATHS BY CAUSES IN CWA CONSTRUCTION OPERATIONS

	Lost-time Injuries	Per Cent Distrib.	No. of Deaths	Per Cent Distrib.
Machinery	1,034	1.9	6	1.7
Vehicles	2,262	4.3	97	27.8
Explosives	244	0.5	12	3.5
Electricity, fire, hot substances	328	0.6	4	1.1
Poisons, corrosive substances	900	1.7	1	0.3
Falls of persons	6,792	13.0	57	16.3
Stepping, striking against objects	4,543	8.7	6	1.7
Falling objects	8,644	16.5	115	32.6
Handling objects	10,404	19.9	16	4.6
Hand tools	8,564	16.9	8	2.3
Animals	278	0.5	3	0.9
Miscellaneous	8,069	15.5	25	7.2
	52,062	100.0	350	100.0

It is impossible to say what the injury frequency rate was because of the incomplete reporting, but the fatality frequency rate was 0.29 deaths per million man-hours. This may be compared with a fatality frequency rate of 0.58 in the construction industry and 0.185, which is the average for all industries reporting to the National Safety Council—and the experience of Council members is far better than average.

On the economic side a corresponding saving was made. The cost of workmen's compensation was not only far below the advance estimate but was about $3,000,000 less than it would have been if the accident rate before Jan. 1 had continued. Since the cost of the safety program was about $2,000,000 (spent for salaries, traveling expenses and such supplies as safety goggles, posters and bulletins), there was a net monetary saving of at least $1,000,000. The $2,000,000, incidentally, was about 3c. per man per week, a sum which compares favorably with the 6c. per man per week that the U. S. Steel Corporation finds it profitable to invest in safety.

Other results are less tangible, but they may, in the long run, be more far-reaching. The national government is now convinced that accidents are not inevitable. They can be prevented by methods that are well known and widely used. Since May 1 the safety program has continued under the FERA. The National Safety Council was retained to make a study of working conditions in the factories of the federal prisons. A former member of the staff of the institution has been employed as safety director of the Tennessee Valley Authority, and the Civilian Conservation Corps has appointed a safety director who held a like position for the CWA in Arkansas.

Creosoted Lumber for Houses

In 200 new homes for employees of the DuPont Rayon Co., Old Hickory, Tenn., 20 per cent of the lumber used per unit was creosoted, to avoid decay and termite attack. Foundations of brick were carried 1½ ft. above ground, and floor joists, sills and outside stair stringers were concreted, according to *Wood Preserving News*. All lumber was framed and cut to length before treatment, which involved 12-lb. treatment of grade 1 coal-tar creosote.

Highway Viaducts in Oregon of Prefabricated Timber

Built-up columns and concrete deck on timber stringers are features of design used to meet need for a type of structure intermediate between a concrete bridge and simple timber trestle

By C. B. McCullough
Assistant State Highway Engineer, Oregon State Highway Commission

A NOVEL VIADUCT DESIGN, using prefabricated members built up of creosoted timber, has been used by the Oregon State Highway Commission on a new highway entrance to Portland along Fourth Street. Two viaducts have been built: the Newbury St. crossing, which is 377 ft. long with a maximum height of 96 ft., and the adjacent Vermont St. crossing, 464 ft. long and 100 ft. high. In both cases the deck consists of reinforced-concrete roadway slabs supported by creosoted timber stringers that are dapped to provide a shear connection. The supporting structure consists of a series of towers each including two bents made up of three columns and necessary bracing. These columns involve the most novel feature of the design; they have an I-section into which braces and ties, also of creosoted timber, can be inserted to afford effective symmetrical fastening. Joints are strengthened materially by the use of steel gusset plates.

Each column is built up of four 8x14-in. creosoted timbers in the form of an I-section with a web system of 4x12-in. planking (Fig. 2). Two of the 8x14's are used in each flange of the I-section. The three columns are made into a bent by a double system of 4x12-in. swaybracing. Pairs of adjacent bents are connected to form rectangular towers by means of a similar system of tower-and-line bracing. A 20x24-in. timber cap on each bent supports the composite superstructure. Design details need not be described, as they consist of comparatively simple timber framing, and the principal features are shown in the drawings.

The advantages of this three-post, built-up construction are: (1) an extraordinary degree of lateral rigidity; (2) utilization of a system of double swaybracing, thus eliminating the necessity for long and heavy bracing members; and (3) swaybracing connections between the pair of flange members and in the plane of the plank web system. An efficient and rigid connection for tower and line bracing results. Maintenance expense will be reduced, it is believed, by the fact that the built-up columns are fabricated in sections and the entire assembly is constructed in such manner as to permit renewal of individual column members or bracing members under service without disturbing the equilibrium or safety of the structure as a whole.

In the original studies of the design to be used for these structures, both concrete viaducts and concrete arches were considered. Estimates indicated that the lowest first cost that could be expected in a design embodying reinforced-concrete construction throughout would be about $170,000. This is almost twice the cost of the creosoted timber and composite construction viaducts that were built.

With proper maintenance the timber structures are expected to have a service life of 30 to 50 years. Hence an economic comparison of annual expense based on the hypothesis of a 30-year life for the creosoted timber structures and an 80-year life for concrete construction results in a decided advantage in favor of the timber. In making use of this design there was no thought that this type of structure ever would usurp the place occupied by reinforced-concrete viaducts or arch construction. It does, however, indicate the possibility of an intermediate type especially adapted to dry gulches or ravines. Also, it points the way to more efficient and lasting utilization of timber in viaduct construction.

An important feature of the scheme as a whole is the composite construction used in the floor system. Composite construction is no longer new; it was developed by the Oregon state highway department pursuant to a rather exhaustive series of tests described in the Oregon state highway department technical bulletin No. 1, issued in 1933. Briefly, these tests indicated that:

1. The ultimate strength of a composite superstructure of this type will be at least twice that for the same members independently employed.

2. The deflection of the composite-type deck under given loading will be not more than 25 per cent of the corresponding deflection for the same members used independently.

3. In reference to the type of shear connections tested, the best results will be attained with a connection consisting of combined spikes and daps (the type

FIG. 1—CREOSOTED TIMBER VIADUCT nearing completion. Note resemblance to steel structure.

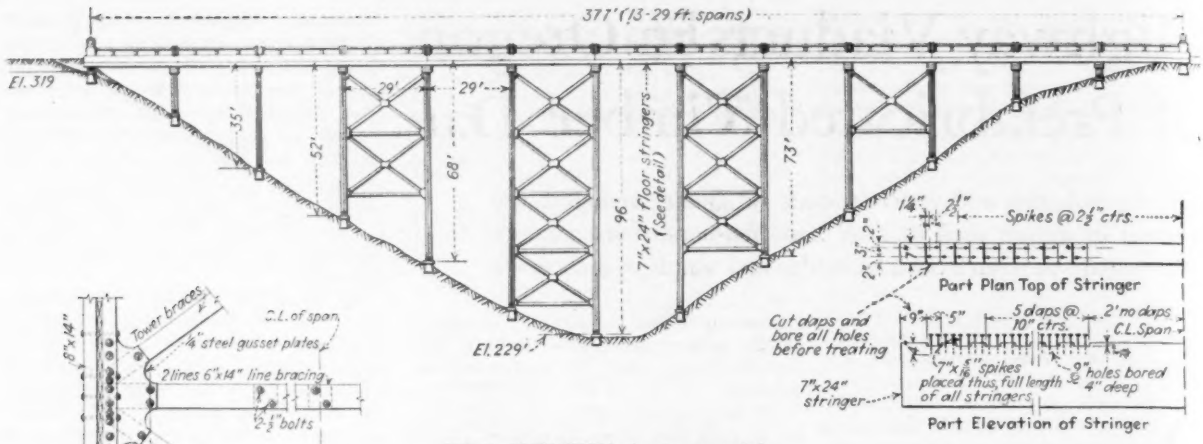


FIG. 3—ELEVATION, showing general design and principal dimensions of Newbury St. Bridge, Portland, Ore. Details of the daps and shear nails for the stringers, to effect composit deck construction, are shown.

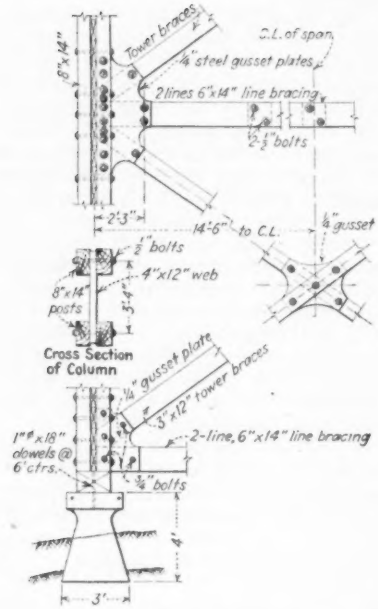


FIG. 2—TOWER-BRACE connections details and cross-section of column.

used in the Fourth St. bridges, as shown in Fig. 3.)

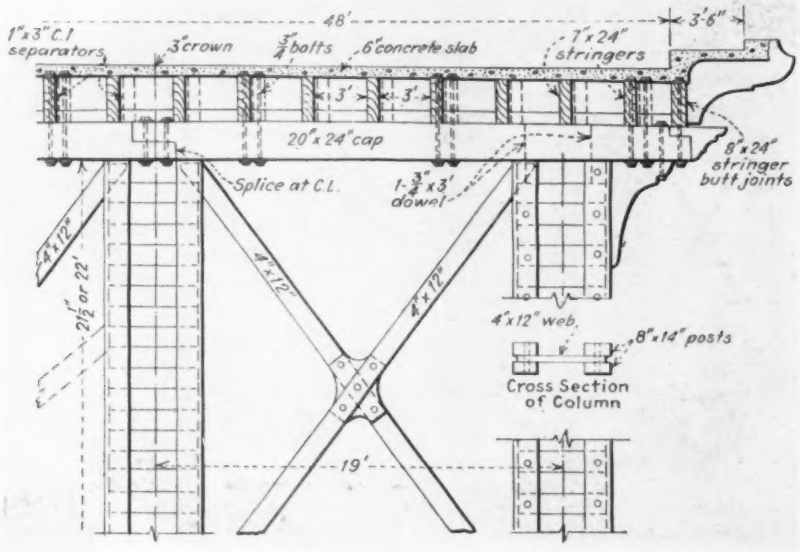
4. Repeated or alternate loads do not appear to have any detrimental effect upon this type of connection.

5. Variations in temperature produce stresses of sufficient magnitude to warrant a definite provision for them in design, but this feature can be adequately taken care of through a proper proportioning of shear connections.

6. The ordinary transformed section formulas will yield results which, within working limits, are sufficiently accurate for all practical purposes.

Subsequent to the completion of the tests mentioned above, standard designs were developed for these composite-type superstructures, and more than 100 bridges employing this principle now have been built. The supporting substructures have been of various types, including creosoted pile bents, creosoted frame-bent construction on concrete pedestals and light concrete piers.

FIG. 4—TYPICAL FRAMING in the upper end of a bent, showing the arrangement of the cap and the deck construction.



On the Fourth St. viaducts all timber used is Douglas fir, which has been treated with creosote in an 8-lb. empty-cell, pressure process. No untreated timber was used anywhere in the permanent structure of the viaduct. All hardware was galvanized, the galvanized items including separators, nails, bolts, washers, drift bolts and other metal used to fasten the component timber members. As far as practicable, all cutting, framing and boring of creosoted material was done before treatment with the preservative, and the contractor was required to provide on the job a suitable apparatus for treating, with hot preservative oil under pressure, any holes that had to be bored in the field.

A contract covering both viaducts was awarded Dec. 13, 1933, to the Hoffman Construction Co., Portland, Ore., for $91,127.

Sludge Gas Used for Power In English Sewerage System

Sludge gas is being utilized to produce electric power for sewage pumping in England at the Eastleigh Urban District, according to an article in *The Surveyor* (London), Aug. 17, 1934, p. 159. There are three pumping stations in the district's sewerage system, all the pumps being driven by electric motors. The electric power is generated at the sewage-treatment plant by two oil engines and one gas engine using sludge gas. The gas engine is rated at 75 hp., and the oil engines are rated at 216 and 75 hp., respectively. Engine cooling water is circulated through the sludge tank to maintain the desired digestion temperature. Additional heat is imparted to the circulating water by the engine exhaust gas. A coke-fired boiler is also used to maintain the temperature of the hot water during very cold weather. Sludge gas from the tank is taken through a pipe line to a 10,000-cu.ft. gasholder from which the gas engine draws its supply. A special gas bag is installed in the feeder pipe to insure a steady supply of gas.

Floating Mixing Plants Will Concrete Wheeler Dam

Navigable depths in Lake Wilson along the entire 6,000-ft. front of Wheeler Dam determined the adoption of multiple mixing plants on barges

By Lee H. Huntley
Construction Superintendent, Wheeler Dam Project, Tennessee Valley Authority, Knoxville, Tenn.

FLOATING mixing plants and barge delivery of concrete materials will be employed in building the Wheeler Dam, which the Tennessee Valley Authority is constructing across the Tennessee River at the head of the pool (Lake Wilson) formed by the Wilson Dam. At the dam site the river is about 6,400 ft. wide. The abutments are vertical cliffs, rising directly from the water, which are about 100 ft. high, as compared with an over-all height for the dam of about 70 ft. To have spanned the river with a cableway for placing the concrete would have entailed an expense that would clearly have been excessive for that type of equipment.

Accordingly, another method for placing concrete had to be adopted, and its selection was based on the navigation possibilities of Lake Wilson, on which the principal railhead from the outside is located. Also, during part of the year, navigation is available from the mouth of the Tennessee on the Ohio River to Lake Wilson.

Floating plant adopted

With delivery of machinery and materials by water, floating plant was logical. It was decided to place concrete-mixing plants (Fig. 2) on barges and then to moor these barges at the cofferdam (Fig. 1) at any desired point. Cement and concrete aggregates could be brought up the river by barges and dumped directly into the mixing plants by cranes mounted on the mixer barges. Inside the cofferdam areas or on top of the cofferdams full-revolving cranes could be erected for placing the concrete in the forms.

Concrete aggregates for the dam are being dredged from the river at a point about 35 miles downstream by the Cumberland River Sand & Gravel Co., which has the contract and is using a dredge equipped for washing and screening, with a crusher for reducing oversize gravel. This plant has a capacity of 400 tons per hour.

During the high-water seasons the aggregates will be barged directly from the dredge to the dam site. To provide a source of supply during the low-water seasons, the contractor has arranged to store considerable quantities of sand and gravel at a point a few miles below the Wilson Dam, where sufficient channel is available at all times for transportation through a canal connecting the river with the locks at the Wilson Dam and thence up Lake Wilson to the dam site.

Placing plant at dam

Inside the cofferdam areas and on top of the cofferdams, six whirler placing cranes have been set up. These cranes are mounted on trucks and travel on a 16-ft.-gage track. Some of these cranes are mounted on gantry frames 14 ft. high. The concrete buckets are two-line bottom-dump buckets, having a capacity of 2 cu.yd. All of this equipment is electrically operated with power brought to the dam site by a transmission line from the Wilson Dam power house.

Based on an estimate of 500,000 cu.yd. of concrete needed for the dam, it is figured that 550,000 cu.yd. of gravel, 275,000 cu.yd. of sand and 700,000 bbl. of cement will be needed.

The specifications call for three sizes of gravel: pea, which will pass a ¾-in. screen and be retained on a No. 4 screen; intermediate, from ¾ to 1½ in.; and coarse, from 1½ to 3 in. Sand must be free of clay and other foreign matter and pass through a No. 4 screen.

FIG. 1—COFFERDAM enclosing foundations of power house and first section of the spillway of Wheeler Dam. The neat line-drilling for turbine implacements is notable.

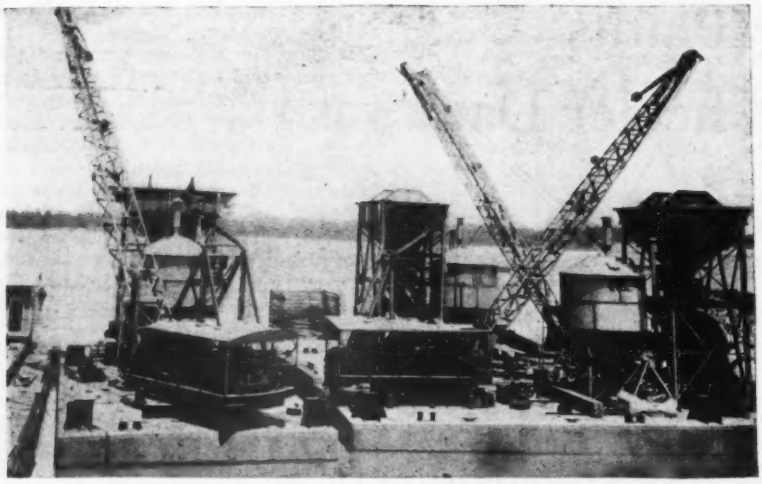


FIG. 2—FLOATING MIXING PLANTS to be used in constructing the Wheeler Dam of the Tennessee Valley Authority. Six of these plants will be employed.

The construction of the Wheeler Dam is under the direction of Arthur E. Morgan, chief engineer and general manager of the Tennessee Valley Authority. Carl A. Bock is assistant chief engineer, C. H. Locher is construction consultant, and Charles H. Paul is engineering consultant. W. M. Hall is construction engineer, B. S. Philbrick assistant construction superintendent, and George K. Leonard assistant construction engineer. The writer is construction superintendent. The Wheeler Dam was designed under the direction of John L. Savage, chief designing engineer of the U. S. Bureau of Reclamation, which also designed Boulder Dam.

Barge-Mounted Mixing Plant Required Special Design

Floating plants for Wheeler Dam called for an arrangement of equipment for batching by weight that would not be affected by constant listing of the barges

By Arthur A. Levison

Chief Engineer, Construction Equipment Division, Blaw-Knox Co., Pittsburgh, Pa.

THE DESIGN of a mixing plant to be mounted on barges has to satisfy different conditions than does the design for mixing plants to be located on land. It was necessary to keep the over-all height of the storage bins at an absolute minimum; otherwise the width of barge required would have to be excessive to prevent overturning. On the Wheeler Dam operation the barges are 40x90 ft., with a loaded draft of 5½ ft. Also, it was essential to embody in the structural design, as well as in the weighing scales, provisions for stability and accuracy under variable listing of the barge. This is constant, for as the revolving crane swings around to pick up a bucketload of aggregate from material barges alongside, the mixer barge lists in one direction; then as the revolving crane returns with the bucketload to discharge it into the aggregate bin, a reverse listing takes place.

Materials bin design

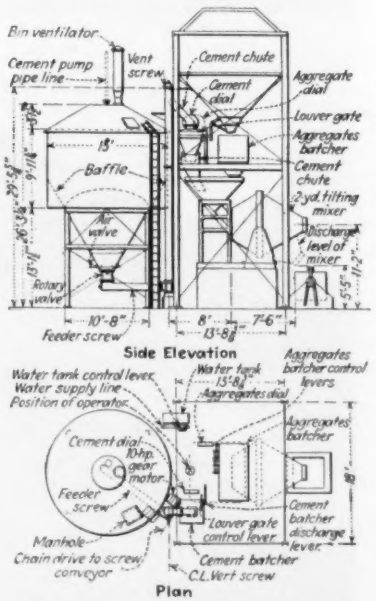
The plant as designed is shown by the accompanying illustration. The aggregate bin with provision for a weighing batcher and a 2-yd. mixer underneath has a height of 30 ft. The mixer is supported on its own pedestal base attached to the deck of the barge. The cement storage bin, 15 ft. in diameter, is cylindrical and is set low to concentrate as much weight as possible close to the deck of the barge. The discharge of cement is controlled by a 14-in. rotary valve, and just above this valve are air jets to loosen the cement in case it arches or packs and refuses to flow by gravity.

The compact arrangement in the plan for transferring cement from the bin to the batcher is to be noted. The cement bin discharges into a horizontal screw conveyor that is about 8 ft. long. The horizontal screw feeder empties into the bottom of a vertical screw conveyor, which elevates the cement to a sufficient height so that it can be discharged by a gravity chute directly to the cement-weighing batcher. The horizontal screw and the vertical screw are driven by one electric motor located on the deck of the barge.

Weight-batching equipment

The cement-weighing unit or batcher is supported off the gravity chute that feeds it. It has a springless dial scale. A unique feature is the type of gate used to control the feed of cement from the gravity chute into the weighing hopper. It is a louvre gate composed of three blades operating very much like a shutter. It is opened and closed by a small lever. As the operator opens this lever to measure out a batch of cement, the motion of the lever is interlocked with the electric motor that operates the screw conveyors, and the screw begins to feed the cement to the batcher; when exact weight is reached, closing the lever shuts off the flow of cement and at the same time stops the screw from operating, by shutting off the motor. The springless dial scales for this cement-weighing batcher are suspended from the framework of the batcher so that they always hang plumb regardless of the list of the barge. The aggregate-weighing batcher has a springless dial scale of the same general type.

The water-measuring tank holds 100 gal. The two valves are arranged so the discharge valve cannot be opened unless the filling valve is previously closed. This is accomplished by a



BATCHING PLANT designed for floating mixing plants for concreting Wheeler Dam of the Tennessee Valley Authority

mechanical interlock. The measurement of water is controlled by an adjustable overflow pipe, located centrally inside the tank to prevent errors due to listing of the barge. Also these tanks are hung from the bins instead of being supported on the operating platform as shown in the drawing. Regardless of the listing of the barge, the tank is always level.

This plant is designed entirely for manual operation of the batching equipment and for one operator to handle the batching operation for the mixer, and also the discharge of the mixer into the concrete buckets. Manual operation was specified by the Tennessee Valley Authority because the authority felt that, inasmuch as they were doing their own work and not having this work done by contract, they could obtain the degree of accuracy of measurement of the aggregates and water that they needed and the speed that was required with manual operation instead of automatic batching, which is now becoming so popular on the larger construction jobs.

Planned Road System for China Makes Good Progress in First Stage

AN INTER-PROVINCIAL highway system adopted in 1932 by the National Economic Council of China is well advanced and is to be completed by the end of 1935 as the first stage of a modern national highway development. It covers the seven provinces constituting the central group: Anhwei, Chekiang, Honan, Hunan, Hupeh, Kiangsi and Kiangsu. The system includes eleven main routes, aggregating 7,403 miles, and 63 branch roads (6,423 miles), making a total of 13,826 miles, at an estimated cost of $115,000,000, of which about $39,000,000 is provided by loans from the central or national government. All highway work under the National Economic Council is in charge of the Bureau of Public Roads, of which S. C. Kang is chief engineer.

A construction program was arranged in five periods of eight to ten months each, and a report of the Bureau of Public Roads in June, 1933, showed 5,037 miles open to traffic (2,017 miles surfaced and 3,020 miles earth roads), with 2,514 miles under construction and 6,185 miles projected. For 1934 the program includes about 3,100 miles of important trunk lines to be built by the provinces, in addition to which the bureau undertook to build about 620 miles of main roads in the northwestern provinces.

Since traffic is mainly very light, earth roads form a large part of the system, and the average cost for all classes is $9,700 per mile, exclusive of bridges and other special works. Voluntary labor is employed in many cases as a means of keeping the cost within limits. In general, engineers of the Bureau of Public Roads inspect the work and act in an advisory capacity to the provincial governments, but heavy or special work is sometimes undertaken by the bureau in order to avoid delays. Examples of such cases are a river ferry and a topographic survey for a road in rough country.

Standard requirements include roadbed widths of 39.36 ft. for first-class roads; 29.52 ft. and 24.6 ft. for those of the second and third classes; maximum grades, 6 per cent, or in special cases 8 per cent, but not exceeding 656 ft. in length; minimum radius of curves, 164 ft. in flat or 50 ft. in mountainous country, with sight distances of 328 and 197 ft. respectively. But minimum curves must not be used on maximum grades. Reverse curves must be separated by tangents at least 98 ft. long. Roads may have from one to three lanes of traffic, allowing 9.84 ft. for each lane, except that for more than one lane the width may be reduced by 1.64 ft. To determine the economic values of different kinds of paving, a 1½-mile experimental road has been built with 30 kinds of construction. Samples of soils and road materials used on all new roads are sent to the Bureau of Public Roads for examination and tests.

For surfacing, roads are divided into six classes: (1) earth, where the soil is suitable and rain is not heavy; (2) surfaced with gravel, cinders, shell, coarse sand or broken brick: (3) clay-bound macadam; (4) stone pitching; (5) bricks or stone blocks; (6) concrete or bituminous paving. This last is permissible only where absolutely necessary and where native products can be utilized. Thickness of surfacing is 6 to 10 in. for classes 2 and 3; for classes 4 and 5 there is 3.2 to 6 in. of foundation, 1.2 to 2 in. of intermediate course and 4 to 6 in. of surface. The foundation course may be of broken brick, broken stone or telford stone. Permanent bridges must be 20 ft. wide and designed for a 10-ton roller or motor truck. Temporary bridges, 13.12 ft. wide, are to carry 5-ton loads. Items of cost will vary with local conditions, but total cost per mile, including grading, culverts, bridges and surfacing of the gravel, must not exceed $12,742 for first-class roads, $10,322 to $12,100 for second-class, or $9,840 for third-class roads.

Traffic regulation and promotion are duties of the National Economic Council, which has drafted rules governing motor-vehicle traffic and has imposed a surtax (10 per cent of the license fee) on registered vehicles, all former toll charges being abolished. Of this surtax, 25 per cent is retained by the provincial government for maintenance and improvement, while 75 per cent is paid monthly to the Council. A number of bus lines are in operation. Traffic survey stations have been established, and the bureau is redesigning the old type of native carts, which have destructive narrow hard tires. To provide a supply of engineers for future road construction and maintenance, the bureau employs a number of young graduates from technical colleges, and in 1933 organized the first summer school for highway training.

Loans made by the National Economic Council to the provincial governments are generally 30 to 40 per cent of the cost of grading, bridges, culverts and paving, the provincial government assuming the expenses for land and clearing and removal of buildings. To obtain a loan, this government must in its application give specific description of the proposed road, with plans and estimates. Payment of the loan is distributed as follows: 15 per cent on the signing of the agreement, 20 per cent when grading is completed, 15 per cent when bridge and culvert work is begun, 30 per cent when this work is finished, and the final 20 per cent when the road is completed. The money must be spent only on the road named in the agreement. Interest is charged at 4 per cent, with no interest charge if the loan is repaid within one year. Repayment must be made in four years, with a two-year extension if necessary. If such repayment is not made, the provincial government is not entitled to any further loans.

Orifice Limits Water Use While Bills Are Unpaid

A simple and ingenious device has been developed by William Coudoux, superintendent of the Forest Park (Ill.) waterworks, to allow indigent water consumers to draw enough water for drinking and sanitation purposes, while at the same time preventing the use of large quantities. A metal disk with a small hole in it is placed in one of the unions near the water meter and then sealed so that it cannot be removed without knowledge of the water department. The orifice permits water to flow at about a 1-gal.-per-min. rate, sufficient for drinking or flushing toilets, but not enough for shower baths or other purposes. When the water bill is paid up in full, the disk is removed. In the meantime sanitary conditions in the home are not impaired.

Policy and Management Emphasized at Public-Works Congress

Emergence of municipal engineer into administrative duties forced by relief activities—New outlook on planning gained through housing studies and economic scrutiny of public works

Engineering News-Record Staff Report

NEVER BEFORE have economic and financial problems of such importance confronted American cities. These problems call on engineers and public-works officials for the most effective services they can render in connection with administration, management and control of all public-works activities. Thus did Charles M. Reppert, president, American Society of Municipal Engineers, throw down th gauntlet to the national congress of his organization, the International Association of Public Works Officials and the New York State Association of City and Village Engineers meeting in Rochester last week. Further he stated as follows: While technical problems will always be one of the important responsibilities of the profession, the problems of the day are primarily management and control of public works. Unemployment relief resulting in made-work programs should be concentrated on maintenance deficiencies. As fixed charges are the greatest contributor to the tax burden, the public-works official and engineer should have a definite hand in planning further works, and extensions that are not likely to bring an adequate return should be avoided by better planning for logical community development. Housing needs the engineer's point of view regarding site selection, development and layout as fitted into existing service facilities.

Other phases of this subject emphasized at the five-day congress included municipal engineering personnel; relation of municipal engineers to unemployment relief; need for engineers in public service; "city development" as a substitute term for "city planning," with engineering economics paramount in setting policies; need for engineering thinking in housing; paving materials, particularly those of low cost; what engineers have already taught social service agencies through CWA and FERA; and the probable future of relief-work programs. A most inspiring note of optimism for the future of engineers with imagination on public work was sounded by Col. Henry M. Waite. Further, the meeting gave attention to utility regulation and rates, traffic-light nuisances, airport engineering, surveying standards, research importance, sewage-treatment and water-supply trends, waste disposal and street sanitation.

Relief

Perry A. Fellows, chairman of the committee on municipal engineering personnel, recounted the experiences of the city engineer in contact with the various relief agencies. The new partnership may bring to the social worker, he felt, some technical concepts of permanent value quite new to that field. He remarked that the "key" salary data presented by Arthur Richards' report to the American Society of Civil Engineers have been a valuable guide to the work division of FERA. He urged the AME to extend these data, as this organization could probably influence PWA and FHA.

An entire half-day session was devoted to a discussion of the lessons that were to be learned from the CWA and FERA work programs. The highlight of this discussion was a presentation of the probable future course of emergency relief work by Jacob Baker, assistant administrator of the FERA. Mr. Baker first reviewed the history of the CWA and FERA in their efforts to relieve the distress occasioned by unemployment. He then commented on the probable future of work-relief activity, announcing that it would without question be carried on during the coming year. Much more attention will be paid, he said, to projects designed for "white-collar" workers.

Engineers' jobs and pay

The effects of the depression on compensation and employment of engineers in public service were exhaustively treated by Arthur Richards, research director, New Jersey Taxpayers Association. The data presented in chart form indicated the trends during the last five years as deduced from questionnaires sent to numerous municipal and governmental agencies employing engineers. A few of the results are as follows:

The peak year of employment for street improvements was 1927, but by Jan. 1, 1932, it had dropped 68 per cent. The peak employment of engineers on sewerage improvements was in 1929, and by Jan. 1, 1932, the drop was only to 95.5 per cent. It was concluded that in the future new sewer construction will lag behind street improvement. Special assessment work is now but 10 per cent of that in 1927. In summary, 44 per cent of all engineers employed by cities in 1927 had lost their positions by April 1, 1933, and 48 per cent by the end of 1933.

The peak year for employment by cities was in 1927, by counties in 1929, by states in 1931, and by the federal government in 1933. Since the survey was made, federal employment has increased tremendously, and therefore the peak year has advanced to 1934.

For two years after the inception of the depression in 1929 neither cities nor counties reduced their personnel or expenditures to any considerable extent.

The curve for employment by states did not begin to decline until 1932, and by the end of that year had reached index 84.5. The curve for federal service increased from index 49.8 in 1927 to index 100 in April, 1933, and therefore from a standpoint of reduction in personnel it has not been affected at any time by the depression.

On salary reduction a general curve covering the reductions in salaries of engineers throughout the country in public employ shows that 50 per cent of the engineers have had a reduction of 16 per cent or more since 1930, and that 25 per cent have had a reduction of 23 per cent or more.

Personnel problems

More careful selection of employees for public-works departments will be necessary in the near future in order to give the taxpayer the best return for his money, according to Charles S. Shaughnessy, chief examiner, Philadelphia Civil Service Commission.

"Provision should be made for training public-works personnel and all other public employees. This could be coupled with our educational system. Training schools should be maintained for all city employees as well as for policemen and firemen, as is now common.

"One of the most discouraging aspects of the public service, however, is the restricted opportunity for promotion. A great number of employees are in blind alley jobs, largely due to the failure to adopt classification and rating systems. Measuring efficiency of employees has been the subject of debate for many years, but up to the present time no satisfactory system has been developed.

"Pension systems in our public service also need revision. Few are on an actuarial basis. Retirement at a fixed age would have the effect of draining off older employees who have been a

drawback to efficiency. Pension systems that are sound, with joint contribution from employer and employee and compulsory retirement at a certain age, will go far toward improving the new day in public-works management," he concluded.

Engineers with experience in administration are lacking, and there is a need to make public service attractive so that men of engineering mentality will look upon public service as a career, said Thorndike Saville, executive engineer, water resources section, National Resources Board. Equally essential it is to make the engineer efficient in such positions. The attracting features noted are salary, security and satisfaction. Opportunities should be made for the right recruits to be trained and then entered into judicial, administration and welfare offices.

Engineers should plan

"Plan-minded municipal engineers have a wide field for future service," stated Col. Henry M. Waite, director of the newly created Cincinnati Regional Department of Economic Security. "The great need of the country today," he said, "is to think in broad terms of planning—federal, state, county, district or drainage area. The city engineer should participate in this job.

"At one time political appointments to the city engineer's office, uncertainty of tenure and the restriction of responsibility were serious handicaps. Now the people in general have been educated to good engineers. Citizens will not stand by and see poor engineering done. If a large engineering project goes wrong through poor execution, it cannot be explained by any political party. The greatest failure of the engineer in the past, was in neglecting comprehensive planning for the future. This had three causes: probable lack of imagination on the part of the engineer, hard press of work and lack of necessary money for planning.

"Today there is a great opportunity for engineers with imagination enough to look into the future fairly. At the same time they should be forceful enough to sell and explain their ideas. The engineer as a rule is a poor salesman. His tendency is to dodge public responsibilities. He becomes a machine rather than an individual."

Frank W. Herring, *Engineering News-Record*, in a talk on research stressed the necessity of maintaining continually an attitude of non-satisfaction with existing service operations, which, if allowed to express itself, would naturally lead to research into the daily problems and tasks. A spirit of skepticism and analysis of departmental problems in the light of new technical and social developments, he claimed, was essential to keep abreast of the times.

A. E. Roche, Troy, N. Y., in discussion queried whether public works were keeping up with other governmental activities. A report of the New York State Conference of Mayors indicated increases in expenditures for the fifteen-year period and up to 1932 as follows: public safety, 180 per cent; education, 278 per cent; recreation, 214 per cent; charity and welfare, 515 per cent; debt service, 219 per cent; and for public works but 156 per cent.

Housing

Walter H. Bleecker, city planning commission, Detroit, expressed the opinion that many of the social service survey data are of little import in solving the housing problem. Many facts presented simply prove the obvious. More important are the industrial and population trends, relation to the industrial area, transportation facilities, money earned, condition of the families. Architects, in making plans, few of which have been adequate, stress too much the individual without considering the relation to the whole. He criticized engineers for perpetuating the checkerboard system of streets. This uses too much land that might be thrown into park and open space.

Samuel A. Greeley called attention in discussion to the necessity of considering existing utility facilities and provisions for waste collections. One recent project made no provision at all for waste disposal. All factors need appraisal; hence the coordinated work of engineer, architect and sociologist is essential.

Planning problems

"City development" rather than "city planning" as a term would more effectively arouse public interest to the necessity of planned city development, said Thomas Buckley, chairman of the AME city plan committee. Other points made by Mr. Buckley were: sensible and dependable planning of the structural form of cities is an urgent problem in city development. The most serious faults relate to quality, harmony, coordination and balance of the various elements rather than weakness in the basic scheme. The cost of correction by reconstruction has been prohibitive to a large degree in the past. However, a gradual means of improving the structural form of municipalities, through the medium of three radically different controls, has been suggested. The controls recommended are zoning, control of extent of growth and decentralization.

Zoning is the only one under trial. Repeatedly it has failed to establish a proper balance or relationship between certain critical elements such as active and potential use areas.

Growth control is as yet an untried theory, but it is recommended by many competent and experienced engineers and planners as the surest means of saving our towns and cities from further diaster.

Decentralization has been suggested for a number of years as a cure for the growing pains that beset the modern city. While opinions as to the real merits of this plan vary, its supporters are strongly advocating it now that renewed interest in city development has been awakened. Industry constitutes the primary economic resource in many towns and cities. Judging by the propaganda and efforts displayed by local civic organizations, there was not enough industry to satisfy all, even in the boom years. Industry is subject to such far-reaching influences and such variable and subtle factors that the ability to decentralize at will, without disastrous results, in some instances, may be seriously questioned.

Financing city development, aside from actually securing the money, is tied in closely with population trends, with economic resources of the city and with sources of municipal income: how many to pay the taxes, population decreases and emigration of higher income groups are factors some cities have to reckon with when planning future developments.

Housing also enters into this urgent business of planning. Housing it not a problem born of the depression. Planning in the past for the most part simply failed to concentrate on it.

Street-maintenance economies

George B. Sowers, chairman, outlined the work of the national committee on street-maintenance economics, which is the second project of the national committee on municipal standards headed by Col. H. M. Waite and composed of representatives of the National Municipal League, City Managers Association, the American Municipal Association and the Governmental Research Association.

It is the hope and expectation of the committee that a complete and comprehensive system of records may be developed for cities of various sizes, which can be easily and economically installed in the accounting system of the average city hall: a system that will provide the paving maintenance superintendent and engineer with the proper information to plan, supervise and control the operations of his department so as to keep the city's pavements in good and safe condition at the lowest cost; a system that will furnish him with a basis of facts for preparing and adhering to budget and appropriation estimates; that will supply him with a method of reporting his work to his superiors and the public, and will develop sufficient uniformity in reporting so that quantities, costs and methods in one city may be directly compared with those from another.

The proposals that the committee will recommend include: a complete plan for

financing, managing and accounting for maintenance and transport equipment; a plan for financing, accounting and charging for the restoring of pavement cuts by private utilities; a system for controlling and accounting for the expenditure of gas-tax and motor-license funds; a scheme for recording the service rendered or work done on each street, which will provide a basis for answering complaints and planning future maintenance requirements; a scheme for recording the facts, figures and data necessary in determining when a street should be repaved, resurfaced or just repaired; and, last but not least, schemes for preparing the annual street-maintenance budget.

Low-cost roads

Samuel Eckels, chief engineer, Pennsylvania department of highways, outlined the development of the low-cost type of roads in his state as follows:

In August, 1931, the Pennsylvania state highway system was increased by the addition of 20,000 miles of rural routes, most of them classified as unimproved. The complete maintenance of these roads was assumed, and their hard surfacing was promised as rapidly as funds permitted. This extensive program enhanced the importance of highway economics and emphasized the necessity of conserving funds. It was not permitted, however, to overlook proper consideration of such fundamentals as satisfactory alignment, grades, width, drainage, character and depth of base, type of surface and superelevation.

Several types of bases and surface construction have been used, including oil-bound, penetration, premixed material or heavy-surfaced treatments on native stone, slag, gravel or commercial stone bases. A knapped native stone base with an oil-bound top has been preferred where its construction has been practicable. The construction, which has principally been by department forces, has been carefully supervised in accordance with up-to-date specifications, increasing the amount of oil and chips over the amounts of former standards.

Bituminous-type surfaced roads adequate for their traffic demands have been successfully built, the total costs ranging generally from $6,000 to $9,000 per mile.

Highway sidewalks

Protecting the pedestrian on highways by providing sidewalks has had some encouragement during the past year, according to George Warren, Boston, chairman of the highway sidewalks committee. Most of the advance has been in arousing public sentiment, however, rather than in actual construction of walkways in the country.

Allocation of federal highway funds to build walkways for pedestrians along public roads is looked upon as an important step toward furthering regional and state interest in the movement for constructing them.

Milwaukee County, Wis., with 20 miles of new walkways, is cited as having accomplished the most progress during 1934.

Reviewing recent paving developments, E. L. Knebes, Milwaukee, Wis., noted concrete vibratory practice, joint-filler experience (still perplexing), increase in use of bulk cement and new uses of the mudjack. In brick pavement, points noted were the extended use of vertical fiber brick, surface removal of filler material, trend to stiffer fillers, and the de-airing process to make tougher brick. In asphalt, the demand is being met for low-cost pavements by two-course pavements utilizing power distribution, cold mixed-in-place and better control of mixes. M. C. Johnson recounted the experience in Indianapolis with economical resurfacing with concrete.

Traffic signals

Improvements should be made to traffic signals to avoid nuisances, according to Burton W. Marsh, chairman of the committee on traffic control. Reasons why some of them are annoying, objectionable or harmful were listed as follows: Lack of necessity, poor design, poor location, improper operation and poor maintenance. Good signals must first be warranted or needed, and the need must be definitely established. They can govern speed and provide for reasonable, continuous movement along an artery. Their design and installation is an intricate engineering job, and facts must be secured as a basis for any decision about signalization. Data on such things as vehicles passing, left turns, pedestrian volume and accident incidence need to be geared to the manual yardsticks of the National Conference on Street and Highway Safety.

Water-purification trends

Only those waterworks projects that have been badly needed have gone ahead under PWA allotments, according to Paul Hansen. To Aug. 1 allotments were $96,553,810, of which 285 were entirely new, 135 for sources, 74 for purification, 316 for distribution systems, 87 for improved storage and 50 for miscellaneous projects. Distribution absorbed the greatest amount of money, $38,000,000; filters only $12,000,000. Population connected with all projects was 17,700,000.

"PWA restrictions have had a tendency to force contractors to use more machinery rather than less," he said, "so as to avoid higher-than-normal wages and inefficient workmen. Many needed waterworks still need financing."

Sources are now selected with greater circumspection, due to increasing population density and the increased volume of sewage and industrial waste. The drought has emphasized the necessity of adequate feeder mains and the value of elevated storage. A marked trend toward pumping by electric power is noticeable. This is due to better power service, high efficiency of centrifugal pumps, the availability of added standby service through development of internal combustion engines, freedom from repairs, automatic and remote control possibilities. Increase in softening is also noted. More careful designs are made for chemical treatment. A marked tendency is observed toward improved preliminary treatment. Filters are washed more vigorously with rates as high as 42-in. vertical rise.

Airports

Consideration of the various phases of airport developments have year after year been covered consistently in the A.M.E. programs. This year there were papers on the following topics: airport selection and construction, bringing up to date the elaborate previous papers and reports by Perry Fellows; administration and use, and a paper on light and sound at airports that contained the following figures: 2,000 new airports will be required in the next few years; there are only 1,200 now in use, with only one-fourth of them equipped with such electrical aids as lighting, radio or public address systems. With 40 per cent of all commercial flying done at night, artificial lighting is essential.

Sewage-treatment progress

Sewage-treatment plant construction during the past year has been small, according to L. R. Howson. The construction that has been undertaken has been due almost entirely to PWA financing. Over 700 cities have received allotments for sewerage and treatment, involving $200,000,000. New sewer revenue laws have been enacted in seven states. Several hundred cities now make sewer charges; over 200 are in Texas. Dayton, Ohio, reports less than ½ per cent delinquency in 48,500 accounts.

Improvements made in treatment methods include more efficiency in settling tanks through better control of distribution, inlet and outlets and the new center feed designs for radial-flow tanks. Increases in efficiency from 25 to 60 per cent are recorded.

In sludge digestion no new developments have been made, but accumulated data indicate that optimum ideal temperatures may vary from 80 to 100 deg. From 11 to 12 cu.ft. of gas may be expected per pound of volatile matter in the sludge added to the digestion tank and from 20 to 23 cu.ft. per pound of volatile matter destroyed. Following the gas-engine installation in Spring-

field, Ill., which paid for itself in eighteen months, other engines have been installed in plants at Rockville Center, L. I., Newark, N. Y., Fort Atkinson, Janesvillle and Madison, Wis., Cedar Rapids, Ia., Peoria, Ill. and others. Gas is used for incineration of screenings and scum at Erie and Lancaster, Pa., Aurora and Rockford, Ill.

Sludge is treated in most cases by drying. At least in cities of 100,000 and less it is done on sand beds either in open or under glass. Open beds in the north can be flooded five to seven times a year and under glass up to twenty times. All larger cities are considering filtering sludge, but Chicago is the only one considering doing it prior to digestion. Ferric chloride is the usual conditioner. Experiments at Baltimore on washing digested sludge prior to filtering have indicated the possibility of increased filter efficiencies. In general, however, designers are loath to eliminate digestion. Chicago is the only city in which mechanical drying and incineration are being seriously considered. A 20-ton plant burns raw-sludge filter cake without fuel if the cake has a moisture of 70 per cent or less. At Hagerstown, Md., the paper pulp and lime process was found unsatisfactory, and a change to ferric chloride and lime was made. The vacuum filters produce a cake with 80 per cent moisture.

Chemical precipitation has aroused much interest but no large plants have been built.

Chlorination continues in popularity, particularly to sterilize effluents discharging near bathing beaches and water intakes. Also many places have used it to reduce B.O.D. content. Downers Grove, Ill., Fostoria, Ohio, and other plants have been able to show reductions of 15 to 35 per cent.

Activated sludge has not lost any prestige by reason of the decision in the Milwaukee patent litigation. The Chicago case has not been decided. Smaller plants show an increased use of mechanical aeration.

Sewage treatment is an evolutionary process in which advancement is continuous but sometimes not fully appreciated until perfected. It cannot be doubted that the experimentation in the laboratory and in the operating plants is largely responsible for the progress recorded.

Refuse disposal

Reduction of garbage and incineration of waste in plants complementary to each other exist in Rochester. The plants are located in the heart of the city but create no nuisance.

Hog feeding at Flint, Mich., is handled by the city. James R. Pollock, director of public works and engineering, described the system, confining himself most to the hog-raising and marketing process. Western hogs formerly were bought, but it has been found better to use Michigan pigs bought in Detroit where the short time of transport gives less loss during the period of vaccination for hog cholera. At 6c. per pound a good profit over operation expense can be shown. As Flint produces 460,000 lb. of pork, an increase to 8c. means an added $10,000. The hogs are fed garbage only and have brought top prices.

A. E. Roche in presenting the report of the committee on street and sanitation records said the forms and methods established were being used by an increasing number of cities. A table of costs from many cities was presented. Garbage disposal by incineration in Baltimore, Washington and Cincinnati cost $3.54, $3.24 and $3.49 per ton. In Flint the hog-feeding cost was $2.98.

Utility problems

Public-utility regulation has not failed—it has never been tried, according to William A. Roberts, peoples counsel, Public Service Commission, District of Columbia. What he meant was that it had not been given a chance to succeed because of political officeholders, an impractical administrative set-up through confusion of administration and judicial functions, and inadequate appropriations. However, in his opinion, the principal abuses against which the public demands and requires protection have been overcome. Regulation has benefited security holders and is not incompatible with public ownership. He recommended, for a practical regulatory organization to make regulation effective, that a judicial attitude be taken, that an elastic staff under a single director be established, that rate investigations be expedited by permanent inventories, periodical pricing, job records and improved uniform accounts, and that trials of rate cases utilize the "flying staff" method.

Field engineering

Last year the committee on municipal field engineering laid down an elaborate program covering all phases of survey and field work. Included this year is the preparation of a bibliography of recent books and articles, covering datum planes and benchmarks, measurement of flow in sewers, encroachments, stadia advantages, tape stretching, sounding practice and subdivision regulation and requirements. Walter Starkweather, chairman of the committee, stressed the fact that the first step in making the natural resources surveys so much in the public eye involves topographical maps, and he urged an early completion of the mapping of the country.

Letters to the Editor

Eccentric Rivet Connections

Sir—In your Aug. 2 issue, p. 149, there are three methods published with reference to simplifying design for eccentric rivet connections. I agree with all three on both theory and adaptability but have found that the combined graphic method is just as good but faster.

Take, for example, an angle connected to the main member by five rivets. It is well known that the rivet located farthest from the center of gravity of the group will get the maximum stress, and to determine the magnitude of this stress the following method seems to be the fastest: If in the accompanying diagram $P = 30{,}000$ lb., the direct shear S on each of the five rivets will be $30{,}000 \div 5 = 6{,}000$ lb. After finding the center of gravity E of the group and marking each rivet by a number, measure and tabulate as follows (with $M_E = 30{,}000 \times 3 = 90{,}000$ in. lb.; $F = M_E d \div \Sigma d^2$; and $M = Fd$. R, the magnitude of the shear stress, in the respective rivets can then be scaled.

Rivet	d	d^2	M	F	R, lb.
1	2.25	5.06	25,886	11,506	15,500
2	1.8	3.24	16,564	9,204	5,500
3	1.0	1.0	5,100	5,100	11,500
4	1.8	3.24	16,564	9,204	5,500
5	2.25	5.06	25,886	11,506	15,500
		$\Sigma d^2 = 17.60$			

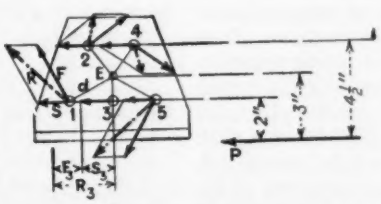


DIAGRAM for determining rivet shear in an eccentric connection.

Koppel, Pa.,
Aug. 8, 1934.

L. J. SAROSDY,
Mechanical Engineer,
Koppel Industrial Car & Equipment Co.

Open-Grid Bridge Decking

Sir—In your issue of Sept. 20, 1934, p. 376, in the article entitled "Service Performance of Grid Deck on University Bridge, Seattle" there are several errors in the dimensions given for Irving decking. The units are 2 ft. wide by 12½ ft. long and shipped to the job in sections 2 ft. wide by 25 ft. long, instead of 18 in. by 30 ft., as stated. The reticuline bars are 1½ in. deep instead of 1¼ in. Also, rivets are ⅜ in. instead of ⅛ in. WALTER E. IRVING,
Irving Iron Works Co.

Long Island City, N. Y.,
Sept. 25, 1934.

ENGINEERING NEWS-RECORD

Volume 113, No. 14. Copyright 1934 by McGraw-Hill Publishing Company, Inc.

EDITOR—F. E. Schmitt. EDITORIAL STAFF—V. T. Boughton, W. G. Bowman, F. W. Herring, C. S. Hill, H. W. Richardson, J. I. Ballard, W. W. De Berard, N. A. Bowers.
Editorial and Publishing Offices at 330 West 42d Street, New York

October 4, 1934

A Job Well Done

CONSUMMATION of the agreement with Mexico that made possible the flood-control work along the border, described in this issue, is a diplomatic achievement in which the engineering profession may well feel pride inasmuch as engineers played such an important rôle in bringing it about. To get two nations to agree on a plan for river straightening that called for numerous changes in the international boundary is no small task. Further, to get legislators to approve of a financial plan involving payment upon a benefit basis and then to put up the actual cash required is a difficult task at best and especially so when the work is international in character. Finally, the setting up of separate organizations on each side of the border, so integrated as to permit construction activities to go ahead independently and yet in such close cooperation as to be almost one enterprise, is a demonstration of international confidence rare indeed in these days.

Evaluating Filter Performance

ALTHOUGH the number of hours that a rapid sand filter will run before washing becomes necessary has served for many years as a rough guide of operating efficiency, comparisons of the performance of filter units have always been fraught with technical difficulties, especially when the units being compared are parts of different water plants. To a large degree the difficulty has been occasioned by a lack of clear understanding of how differences in filtration rate and available head should be allowed for. The discussion of this topic on another page of this issue should be of great value in resolving some of these difficulties, for the Detroit experimenters have concluded that the amount of water filtered per unit area per unit of available head is the proper index to use in making filter performance comparisons. By the aid of this index the effects on filter efficiency of the characteristics of the filter bed or of the coagulated water can be explored with more confidence. To the extent that it allows the student of filtration to isolate the effects of operating variables, the new index is of great value in water-purification research.

Back to Fundamentals

TESTS UNDER WAY AT M.I.T. on the behavior of elevated tanks subjected to earthquake motions cast serious doubt on the adequacy of time-honored design methods. It is well known that the assumption of static forces not only for earthquakes but for wind does violence to the actual conditions. The forces set up by both wind and earthquake are dynamic, and the tests at M.I.T. indicate that for elevated tanks, at least, they had best be recognized as such. For the dangerous ground-motion period of 1½ seconds, a deflection of from 3 to 5 in. is indicated for the prototype tank, whereas the elastic limit of the top tower rods is passed at a deflection of 2 in. and the deflection caused by application of a constant force of 3 per cent of the total weight is only 1 in. The fact that more tanks were not destroyed in the Long Beach earthquake of 1933, although many tension rods were badly damaged, must therefore be taken as further proof of the adjustability under load of steel structures. Still, to count on this adjustability as a safety factor is hardly good design. In urging a dynamic basis for the design of elevated tanks, the investigators at M.I.T. are going back to fundamentals that have been largely ignored in the methods currently used. When it is noted that the investigators represent the Factory Mutual Fire Insurance Companies, whose specifications govern much elevated-tank design, the necessity for engineers to examine the soundness of the argument for dynamic design is clear.

Meeting a New Need

ENGINEERS who serve the public have had administrative responsibilities of increasingly large importance literally thrust on them during the latter stages of the depression. However, all too few have had a hand in policy making. Never has the type of advice and judgment which only the mature engineer can give been more needed than it is now if the public interest is to be wisely and safely served. Recognition of this opportunity for service was evident at the meeting of municipal engineers and public-works officials at Rochester last week, as was a desire for greater participation in such service. Both found expression in the decision of the two national organizations represented in the meeting to join hands in establishing a common full-time secretariat in Chicago, where it can cooperate with the headquarter's staffs of some dozen other organizations in the field of public administration. With this set-up, both members and municipalities will be better served because inspirational activities as well as sober research can be carried forward throughout the year. Engineers in public service may well continue to support this new forward move.

Equipment Made Available

THE PROMINENT PART that equipment manufacturers have played in the advance of construction methods has led constructors to expect that, regardless of the problem encountered, equipment to handle it will be available. Seldom have they been disappointed. The development of the modern concrete batching and mixing plant is but another answer to a construction problem, in this case that of meeting the increasingly exacting requirements of engineers for more precise control in concrete mixing. Production of concrete has changed from a haphazard mixing of sand, stone, cement and water to a carefully controlled manufacturing process, producing predetermined results. Scientific batching equipment made this change possible. In the past three or four years we have come to accept this equipment as a matter of course. Yet the decision to use floating concrete plants at Joe Wheeler Dam calls to attention the difficulties in applying delicate weighing devices to barge operation. Floating plants lack the stability necessary for scale operation. Wave action and the operation of the charging derrick cause listing of the barge. Space and headroom are restricted, calling for compact arrangement of the various plant units. As described on another

page, these difficulties were met at Joe Wheeler Dam by an ingenious arrangement of independent suspension of weighing devices to keep them level at all times.

Lest the Essence be Lost

IT IS A MATTER of surpassing interest that the long-discussed demand for greater breadth of engineering training has become unmistakably articulate during the past year or two. The demand is a true expression of the changed requirements imposed upon the engineering function, as everyone who looks realistically on the conditions of the times will perceive. A few engineers in practical work are aware of these changed requirements and are concerning themselves with study of the economic and social implications of their activities. And so, too, some engineering schools have caught the drift of the times and in their latest curricula are evidently striving to provide the student with a larger and richer grounding.

These developments are gratifying. They carry the assurance that a greatly broadened field of activity is opening for the engineer—for the civil engineer at least and in all possibility for others.

Under the influence of the broadening of view that has begun, engineers should become almost as competent in the domains of policy, of money, of organizational method, whether public or corporate, as they now are in the domain of measurements, forces and powers. Provided they retain their faculty of factual determination free from the bias of inclination or preconception, their work is certain to contribute measurably toward bringing about the more stable existence of the future.

But while we strive for breadth and look ahead to large opportunity, it is well to remember with care that the *technical ability* and *thoroughness* of the engineer will always remain his chief strength and value. The world asks of him *first* that he be a skillful and resourceful engineer, informed in materials, structures and actions of a physical kind, and competent to adapt them effectively and economically to the satisfaction of the world's wants. This has always been so and is so today. It will continue to be true.

Let it then be written down as a lasting truth in the creed of the profession and of the engineering school that the engineer must first be an engineer, skilled and trained in creative utilization of resources by scientific method, before he may venture to become something more. Until he has equipped himself to render to his fellowmen the technical service that is the essence of engineering, he ought not to dabble in other arts.

And this is preëminently so in view of the way in which technical demands have multiplied in very recent years. Even today they are increasing, and this at a rate perhaps more rapid than the demands of other kinds—whether for understanding of sociological factors or for knowledge of the changing complexion of current conceptions of constitutional powers, important as these may be. The technical skill of the engineer must grow in proportion to this increase in demand, or he may fail in the very function that he claims as his own and by which his existence is justified. What will it profit him to become a dabbler in many arts if he lose the mastery of his own?

It is timely to keep such considerations clearly in view while endeavoring to adapt our own thoughts, our schools and organizations to the undoubtedly strong claims of modernism. The mature engineer runs no risk; his technical grounding in determination of fact and planning thereby is a secure possession, and he can hardly be too active in seeking to enlarge his powers by humanistic and economic study. The chance of error is greater in the schools, where the effort to spread the student's attention abroad can operate to stunt his technical growth. And this is the more serious because the school's work of today determines the caliber and quality of the engineer of twenty years hence.

To repeat, it is undoubtedly vital that engineering be caused to grow out of its traditional confines and make contact with the many matters other than physical that increasingly control the engineer's activity. But while giving full regard to the demands of this broadening, let us recognize clearly that technical ability must ever take first place, lest the essence of the engineering art be lost.

Back to the Partnership?

THE current reorganization of the NRA is of vital concern to the construction industry. It comes at a time when business men, according to their accredited representatives, are alarmed over the trend of governmental policy; at a time when NRA's prestige is at its lowest and when almost all that is good in it has been forgotten for the many things that have proved bad. But it also comes at a time when election returns seem to support the New Deal. Under these circumstances, unless some middle ground can be found between the growing sentiment outside the Administration that NRA should be scuttled and the apparent feeling within the Administration that its acts have full approbation, the construction industry stands to lose, either through the scrapping of the gains made through the code work or through the continuation of the indefinite and inconsistent policies that have characterized the NRA to date.

The construction code is a document of great potentiality. In detail it has offered machinery for better labor relations, on the one hand, and for improved bidding and business practices on the other. Most important of all, it has provided the basis for a united and integrated construction industry. In the early days of NRA the possibility of such an achievement seemed real indeed, for NRA was characterized as a partnership between government and business. On the assumption that this was so, the development of a code under the NRA was strongly supported in these pages, all previous attempts to bring about a united industry having failed because of lack of compliance-enforcement machinery. Unfortunately, NRA chose or drifted into a practice of dictation rather than partnership. The offer of self-government became a canard, and the hopes for a united construction industry were blocked.

Reorganization is in order and under way, and it may well be that the new set-up will bring the desired results. The President has promised that those functions of NRA "which have proven their worth" will be fostered and developed. If this means a return to the original concept of self-government, a sincere attempt to allay the apprehensions of business by foregoing the patently impracticable zeal for complete and immediate reform, and the substitution of a definite and consistent policy for one of vacillation, the construction industry should give enthusiastic support to the code work.

CURRENT NEWS

PWA Clarifies Policy For Financing Public Power Plants

THE policy of the PWA in respect to rendering financial assistance to cities and districts for the building of publicly owned power plants has been clarified by a statement made by Administrator Ickes. According to the statement, municipal or local publicly owned power projects will be aided by the PWA only when, in addition to meeting those qualifications necessary for public works projects, they assure electricity to communities at rates substantially lower than otherwise obtainable.

The pronouncement followed action by some privately owned utilities, which, on reexamination of their condition, found it possible to reduce rates to a point below those proposed by municipal project plants. In all allotments made for municipal power plants by the PWA, proposed rates have been well below existing private company rates. Consequently, the fact that the companies in some instances have met these proposed municipal rates has been deemed as showing progress toward one of the aims of this phase of the public works program.

Administrator Ickes said: "PWA has endeavored to make electric energy more broadly available at cheaper rates by acting on applications of municipalities for loans and grants to finance municipal systems where reasonable security is offered and the project is socially desirable. They are deemed desirable where the loan can be amortized in a reasonable period while charging rates substantially lower than those of the existing utility.

"However, we make it a practice before approving the loan to give the company an opportunity to put in effect rates at least as low as those at which the municipal system will be self-liquidating. Several utility companies have accepted this opportunity. It is obvious that in such cases it is advantageous to the city and to PWA that the offer be accepted and the applications withdrawn. To make loans and grants to finance projects where the competitor offers rates which are lower than those possible by the city plant, would duplicate facilities without any social betterment and impose on the city a burden which it probably could not meet without resort to taxation."

St. Louis Voters Reject Bonds For $5,878,000 Sewer Project

By a vote of 10,320 against and 8,156 for, the proposed $5,878,000 bond issue for the construction of 120 miles of trunk sewers in the St. Louis County Sanitary Sewer District was defeated. By the defeat of this financing program, the county lost the PWA allotment which included a grant of $1,349,000.

Low Bid of $7,918,530 Received For Fort Peck Dam Spillway

At the opening of bids for the construction of the spillway for the Fort Peck dam, now being built by the Corps of Engineers on the Missouri River in eastern Montana, the low bid of $7,918,530 was presented by Hardwick & McGlone, Kansas City, Mo. The second low bidder, Central Bridge & Construction Co., Kansas City, Mo., presented a figure of $8,619,473. The major items in the proposal include: shale excavation, 7,160,000 cu.yd.; overburden excavation, 5,922,000 cu.yd., and furnishing and placing 36,000,000 lb. of reinforcing steel. The low bidder presented a unit price of $0.41 for both of these major excavation items, representing an aggregate of more than $5,000,000 and a unit price of 3.75c. for the steel in place.

The low bidder represents a combination of the firm W. S. Hardwick Construction Co., Memphis, Tenn., and Terry McGlone, Kansas City.

Six States of Colorado Basin Confer in Salt Lake City

The six states of the Colorado River Basin, signatories to the Colorado River compact, are holding a conference in Salt Lake City for the purpose of discussing the tentative draft of a contract now drawn between Arizona and the United States. Under the terms of the contract Arizona would secure 2,800,000 acre-ft. of storage rights in Boulder Dam reservoir.

First Federal Housing Project Started in Atlanta

Demolition work on two slum areas in Atlanta, Ga., comprising 58 acres, on which the Public Works Emergency Housing Corp. will erect the first low-cost housing units in its $150,000,000 nationwide program was begun Sept. 29 in the presence of Public Works Administrator Harold L. Ickes. They are the Techwood project for white occupancy and the University project for negroes, costing respectively $2,700,000 and $2,100,000.

In his address at the ceremonies incident to start of demolition, Mr. Ickes pointed out that this was the first time in our history that the Federal Government has gone into a city "in response to pleas for help from its people to aid in clearing up a slum." But he hoped that these and other similar projects to be started in other cities would set such examples that the states and municipalities would take up the program of slum clearance and carry it on as a permanent function of government.

With respect to projects in other cities Mr. Ickes listed the unprecedented condemnation proceedings instituted two weeks ago in Chicago, the recent purchase of land in Cleveland and the fact that options are held on ninety per cent of a site in Indianapolis. He also stated that condemnation proceedings would be started soon in Montgomery, Alabama, and that the Housing Authority of New York City was selecting and acquiring a site for a project.

Failure of Columbus Sewer Tunnel Kills Inspector and Four Workmen

FIVE MEN were killed at Columbus, Ohio, Sept. 29, by a cave-in at the heading of Section 7 of the Olentangy-Scioto intercepting sewer tunnel being driven under Perry St. The men, city inspector Gaylord B. Stephenson and four laborers, were trapped when a section of tunnel near the face of the heading, lined with pressed steel plates, collapsed without warning about 8 a.m. bringing in tons of overlying material. By early afternoon two bodies were reached by rescue squads working from within the tunnel. Two more were found later in the day while the fifth was reached the next day from a shaft hurriedly excavated from the street surface by a crane and clamshell.

The tunnel was being driven south from a shaft at West Fifth Ave. through a sand and gravel formation containing a slight amount of clay. It is 11 ft. 3 in. in outside diameter, with a 15-in. concrete lining. At point of failure, south of West Fourth Ave., the tunnel had 17 ft. of cover underneath the paved street. According to reports of an engineer who visited the tunnel late the previous day, the material was dry. This controverts the newspaper accounts that heavy rains were responsible for the cave-in.

Progress of 15 ft. per day was being maintained. Driving was by the poling plate method, with pressed steel plate lining carried tight against the face, which was kept breasted. The steel lining was braced with trench jacks used as struts. Concrete lining followed close to excavation, with pours made daily. At time of failure the length of steel plate lining exposed is believed to have been about 20 ft. Excavation had stopped and preparations were being made to set up a 15-ft. section of steel form for carrying forward the concrete lining.

Uncovering of the tunnel by the emergency shaft revealed that the breasted face of the heading and adjacent lining plates were undisturbed. The failure occurred back towards the finished concrete lining, though none of the concrete gave way. It is not known whether any of the supporting jacks had been removed in preparation for form erection.

The sewer is part of a comprehensive PWA program, including interceptors and a new disposal plant. The project is under the direction of City Engineer Paul W. Matezel and O. Bonney, sewer relief engineer. Walter S. Rae, of Pittsburgh, is contractor on the tunnel work.

Washington Notes

By Paul Wooton
Washington Correspondent

Administrator Ickes, in a statement made Oct. 2, expressed the belief that the public works program should be continued on a substantial scale by an appropriation from the next Congress. The Administrator said that he could not put a figure on the amount that he may suggest or that the President will accept.

Projects to which the PWA is already committed will require $100,000,000 to carry them along. "Let's call it $200,000,000," said Ickes when Fred Schnepfe, director of the projects division, reported the lower figure.

"I think the public works program has more than justified itself," said Sec. Ickes, "and that, we ought to go ahead with it until we are out of the depression, being prepared, however, to slacken up whenever private industry can provide employment."

Now nearing completion, the Mississippi Valley Committee's report on flood control, navigation, power and related factors will be submitted by Ickes to President Roosevelt prior to publication.

RFC Advances $15,000,000 More For Colorado Aqueduct Work

A further advance of $15,000,000 has been made by the RFC to finance construction operations on the Colorado River aqueduct in accordance with the original financing agreement with the Metropolitan Water District. The new loan will bring the total indebtedness of the district up to $55,000,000, and with these funds the continuance of the construction work is assured until July, 1935.

The district is now calling for bids on the construction of 110 miles of canals, conduits and siphons, which, with the material to be furnished by the district, will cost about $35,000,000. These bids will be opened Oct. 11. The district is also preparing to call bids on an additional 40 miles of aqueduct conduits and siphons to cost about $15,000,000.

The RFC also announced the loan of $1,000,000 to the Disaster Relief Corporation, a newly formed non-profit organization which will reloan this money to the Los Angeles County Flood Control District for the construction of debris basins and other flood control work in the area damaged by the severe floods of Jan. 1, 1934, near La Crescenta.

Adjustment Board Has Issued 32 Decisions On the "40-hr. Maximum" Provision

SINCE the establishment of the National Construction Planning and Adjustment Board of the Construction Code Authority, it has rendered decisions on 32 of the 58 requests for relaxation of the 40-hr. maximum provision of the construction code. On the remaining 26, additional information has been requested, but not received, to enable the board to render a decision, or the requests, after examination, have been referred to other agencies when not within the board's jurisdiction. While the Board decides each case solely on its own merits, the records in the 32 decisions provide indications of the general policy which is being followed and serve as a guide to those bidding for construction projects in evaluating the possibilities of placing the project on a 48-hr. basis.

Policy indicated

Generally speaking, the board has been reluctant to grant a 48-hr. week on the plea that a sufficient amount of qualified labor is not available in the immediate vicinity of the work. Due to the oversupply of construction labor generally available and the relatively few projects under way, the board has ruled in several cases that sufficient qualified labor could be obtained if the numerous sources of labor supply were tapped. Information received by the board indicates that even skilled labor is highly mobile, and on the first announcement of a project, particularly one which may provide continuous employment over some months time, labor is on hand even before the project is open. Accordingly, requests have been denied in cases which under a normal construction program might ordinarily be approved. No permission has been granted in any case involving building construction.

Three requests were received from companies which operate traveling maintenance crews engaged principally in rehabilitation of acquired farm properties, asking a blanket permission to work 48 hours per week. These applications were all denied on the basis that the code does not give the board the authority to grant blanket exemptions, but only exemptions for specifically named projects; also that no extraordinary circumstances were involved, and it was desirable to spread construction employment by working a shorter week.

Inaccessible projects

Even where projects were inaccessible to towns from which labor supply can be drawn, or where inadequate transportation facilities preclude traveling back and forth to the job, each request has been carefully examined under the policy of NRA and the construction code to spread employment. However, the board has apparently recognized the social problem which exists in large construction camps, and the desirability of working a 6 day week from a standpoint of maintaining better camp conditions.

Out of a total of 32 cases on which decisions have been made, 16 were granted and 16 denied, 3 of which were passed for lack of jurisdiction. The 32 cases were made up of 19 heavy construction projects, 3 highway projects, 4 building projects and 6 others. Thirteen of the 19 heavy construction cases were granted, and only 3 of the 13 requests from all other types of work.

PWA Announces Its Repayment Policy For Power Projects

THE policy of the PWA in determining the repayment program for the capital cost of river improvement, flood control, water power and reclamation projects, constructed under the direction of the Corps of Engineers and the Bureau of Reclamation, has been definitely announced in a statement by Administrator Ickes.

The policy is established in the following resolution which was adopted by the special board for public works. The statement follows:

"Whereas certain projects for development of water power, river improvement, flood control, water supply and reclamation (as defined in the Reclamation Act) may economically provide for the sale of electric current as well as of water and for the reimbursement to the United States by such sale of the capital cost of the project or a part thereof and of other expenses, and it is desirable that a uniform policy of price fixing be established:

"Resolved that the Administrator and this board establish the following policy:

"1. All findings, determinations and price fixing herein referred to shall be subject to the approval of the Administrator.

Corps of Engineers

"2. If the project be constructed by the Chief of Engineers he shall determine what portion of its capital cost is attributable to the provisions of water and/or of electric current for sale and shall fix the price at which such water and/or electric current is to be sold. He shall include in the price of water:

"(a) (If for purposes of irrigation) such part of the capital cost, attributable to the provision of water, as will effect the amortization of that cost and meet other charges pursuant to the practice of the Bureau of Reclamation.

"(b) If the water is sold for other purposes than for irrigation the Chief of Engineers shall include in the price such charges as will provide for the amortization of the capital cost, interest, depreciation, operation and maintenance.

"(c) The price of electric current shall include the amortization of that part of the capital cost of the project attributable to provision for electric current, interest thereon, an appropriate depreciation charge, and charges for operation and maintenance.

Bureau of Reclamation

"3. If the project be constructed by the Commissioner of the Bureau of Reclamation he shall make like determinations and price fixing with regard to electric current as well as with regard to water.

"The said chief and commissioner shall consult with regard to such determinations and price fixing with a view to uniformity of practice under substantially similar circumstances and conditions. In the event of disagreement each shall make a submission to the Secretary of War and the Administrator for decision. If they disagree the President will be asked for a direction."

California Cities Request Change In Contracts for Boulder Power

The cities of Pasadena, Glendale and Burbank, Calif., have requested modification of their contract with the federal government for the purchase of power to be generated by the Boulder Dam project.

Pasadena has applied to the Secretary of the Interior requesting a three-year load-building period which would not require the city to take the 68,000,000 kw.-hr. of power per year at the time the energy is available for transmission. The city requested the department to authorize the power to be delivered during this three-year period as was considered equitable and fair.

The cities of Glendale and Burbank likewise have requested modification of their contracts with the government for Boulder Dam power. Glendale has requested a five-year period in which to take its maximum amount, while Burbank has asked for a seven-year load-building period from the date power is available for delivery.

Nebraska Plans to Contest Water Rights on Platte River

The state of Nebraska through its attorney-general has announced plans, Sept. 25, to file an action in the United States Supreme Court against the state of Wyoming "for the purpose of preventing Wyoming from diverting the waters of the North Platte River for the benefit of junior Wyoming irrigators when the water is needed in Nebraska by irrigators whose adjudicated rights are earlier." The state attorney-general has conferred with the representatives of irrigation districts in Nebraska whose rights are alleged to be jeopardized by the present program in Wyoming.

According to the announcement, the suit "will also seek to enjoin Wyoming from taking water for storage when it is needed by direct flow appropriators, most of whom are prior to the storage rights being exercised, and it will also seek to prevent threatened injury to Nebraska appropriations by reason of the construction of the Casper-Alcova project in Wyoming, which, by a recent ruling of the Wyoming state engineer, has been assigned a priority date of Dec. 6, 1904, although work on the project has just commenced."

Opening of Hetch Hetchy Project Scheduled for Oct. 28

Featured by the announcement that Secretary of the Interior Ickes will attend, the celebration marking completion of the Hetch Hetchy water supply development for San Francisco has been scheduled for Oct. 28. The ceremony will take place near the end of the 155 mile aqueduct where the mountain water will flow into the existing local storage reservoirs.

The announcement was made by the committee in charge that Secretary Ickes will make a special trip to participate in this celebration.

The Hetch Hetchy water supply development, which has extended over a 20-year construction period and involved a cost of almost $100,000,000, will provide for an ultimate maximum flow of 400 m.g.d., estimated to be sufficient for the needs of San Francisco for more than a century. The history of the project and the construction features provided the subject for a special issue of *Engineering News-Record*, Aug. 2, 1934.

Bids Asked for Completion of Reading Water Tunnel

The city of Reading, Pa., will open bids Oct. 17 for the completion of the Maidencreek water tunnel. Contract for the 2,350-ft. bore was originally awarded last March to Walter S. Rae, of Pittsburgh, for $179,253, who terminated the contract on August 28, claiming non-payment of an estimate due and alleging incorrect bidding information was furnished by the city (*ENR* Sept. 6, 1934, p. 314). Work done by the Rae company included a shaft 80 ft. deep and the driving of 185 ft. of heading from the shaft bottom, and partial completion of 500 ft. of open-cut work at the south end of the job. Call for bids for the work, to be known as Contract 66A, specifies a bid bond of 10 per cent and a surety bond of 100 per cent. A. R. O'Reilly, chief engineer of the Bureau of Water, is in charge of the improvement.

Suit Filed to Prevent TVA From Buying Power Property

A suit was filed in Chattanooga, Tenn., Oct. 1 to prevent the sale of property of the Tennessee Public Service Co. to the TVA and to stop the city of Knoxville from using a $2,600,000 PWA loan and grant to build a municipal distributing system. The suit was filed in the U. S. District Court on behalf of holders of preferred stock of the power companies.

The bill charged that the contract with the TVA entered July 17 for the sale of the power system and the properties of the utility in Knoxville and the surrounding territory was forced "by duress of the TVA."

BEFORE AND AFTER "FACE LIFTING" JOB ON LOS ANGELES DEPARTMENT STORE

One of the most remarkable renovation operations, as well as one of the largest, in the country, has recently been completed in Los Angeles where the J. W. Robinson Co., at a cost of $350,000, replaced the entire exterior facing of its building. The complete transformation shown above not only provided a building of modern architectural character but increased the earthquake resistance of the structure by removing projecting cornices and replacing the old 13-in. brick exterior wall, which was 12 to 18 in. outside the structural frame, with a glazed tile and terra cotta facing fastened to a reinforced gunite backing shot against the old interior brick wall which is carried directly on the structural frame. The new facing weighs 3,000 tons less than the old wall that it replaced. The terra cotta is used on the pilasters and portions of the walls below the third floor, and the tile, in 2x6 in. and 2x2 in. sizes, elsewhere.

In carrying out the work the entire structure was surrounded by 16 levels of tubular steel scaffolding, furnishing over 2 miles of planked runways. All work was done at night, since store operation could not be interrupted in any way.

E. L. Mayberry, Long Beach, Calif., was engineer-architect with Allison & Allison, Los Angeles, consulting architects. Ralph J. Reed was consulting engineer for the owners. The Richards-Neustadt Co., Los Angeles, was the general contractor for the renovation project.

Private Construction To be Studied By Committee

(Washington Correspondence)

GREATER recognition of the present condition of the construction industry is signified by the decision of Secretary Roper's Business Advisory and Planning Council to set up its committee on private construction as a concentration point where the industry's problems may be studied. The council expects to receive from its committee recommendations which can be passed along to the administration concerning aid that the government can provide to stimulate private construction activity.

With the public works program passing its peak, a shift in interest to private construction is evident. The limitations of the National Housing Act confined the Federal Housing Administration to home modernization and construction but Administrator Moffett seeks to encourage construction and modernization of industrial plants.

RFC loans

RFC's entry into the mortgage loan business has new construction of the heavy types as its primary objective. The corporation program includes the purchase of preferred stock and capital notes of trust companies and the stimulation of new companies, with additional lending as required to relieve distressed conditions which interfere with refinancing on an equitable basis.

RFC Chairman Jones does not expect the corporation's investment to be large as it is his opinion that private capital should come forward. "It is the desire of President Roosevelt and the directors of RFC," said Chairman Jones, "to assist business temporarily by providing mortgage money where it can be done on a sound basis and with no cost to the taxpayer."

Many mortgages made by the trust companies can be insured under FHA's mutual mortgage insurance plan, complementing FHA's program to that extent, but Mr. Jones pointed out that many kinds of property such as factories, office buildings and hotels over FHA's $18,000 limitation on cost constitute a perfectly sound basis for mortgage loans by the RFC.

"Substantial recovery of American business cannot be accomplished until private construction is started on the upgrade," the construction committee of Secretary Roper's council reported this week, following a survey on which it has been engaged since its organization last June. Acting on the committee's suggestion, the Business Advisory and Planning Council henceforward will take an active interest in the construction industry and, through Secretary Roper, keep the administration informed of its condition and of proposals for stimulating its recovery.

Public Works Officials and Municipal Engineers Set Up Joint Secretariat at Chicago

THROUGH the creation of a joint secretariat the American Society of Municipal Engineers (AME) and the International Association of Public Works Officials (IAPWO) have effected a move toward setting up a single full-time staff which will be located at Chicago in close proximity to ten other organizations interested in government and public administration. This action was decided upon at the congress in Rochester, N. Y., last week of these two organizations and the New York State Association of City and Village Engineers. Donald C. Stone, director of the consulting and research division of the Public Administration Service (PAS), was appointed by the boards of directors of AME and IAPWO as executive director. No merger of the two organizations was effected but each named a committee with wide powers to coordinate and work out a program of activity. Already there had been sponsored by IAPWO the work of the national committee on uniform street and sanitation records and another on street maintenance economics. There has been tentatively proposed several research problems: Extension of the large work done by AME on standard specification, preparation of an engineering cost manual and a nationwide system of reporting public works activities and costs.

The society development committee appointed by the AME to cooperate with IAPWO and PAS consists of C. M. Reppert, S. A. Greeley, Thomas Buckley, Guy Brown, W. W. DeBerard, C. W. S. Sammelman and Harrison P. Eddy, Jr. The newly elected officers are as follows: President, Harrison P. Eddy, Jr.; vice presidents, Bryson Vallas, George B. Gascoigne and Thomas Buckley; treasurer, H. L. Howe.

The Greeley awards presented to members who have been in public service for twenty-five years or more were presented to the following: P. L. Brockway with the city engineering department of Wichita, Kan., since 1908; A. K. Johnson, since 1906 with Borough of Queens, New York City, and W. R. Tenney, since 1901 with Brooklyn, N. Y.

William J. Galligan in explaining the proposed cooperative action to IAPWO stated that neither the identity nor the prerogative of either organization would be lost. For two years conventions have been held in the same city with overlapping dates and combined programs have been arranged for several sessions. The experience at Rochester with a 5-day congress, however, indicates that a closer coupling is essential to attract full attendance throughout the week. The registration at the meeting of 250 is more than double that of the last few years justifying the combination.

The newly elected officers of IAPWO are as follows: President, Alfred E. Roche; vice presidents, Mark B. Owen, J. E. Root and John S. Flockhart; treasurer, E. A. Miller, and secretary, A. M. Anderson, Chicago.

General Contractors Protest Doubling of Assessments

AFTER five months of controversy in which the AGC protested the imposition of code assessments from the Mason Contractors Divisional Code Authority, the controversy has been taken by the Divisional Code Authority for General Contractors directly to NRA for adjudication. The position of the AGC is based on the contention that NRA Administrative Order X-36 provides that no member of an industry pay an assessment except to that code authority governing his major line of business. The General Contractors' Divisional Authority delegated a special committee composed of A. E. Horst, chairman, A. C. Tozzer, W. F. Austin and Robert A. Whidden to lay the pertinent evidence before NRA Division Administrator George L. Berry and to seek a definite ruling relieving general contractors from all accountability to the mason contractors division.

The administrator has called a conference for this week between representatives of the two code authorities, and, in the meantime, has requested that all matters in controversy be held in abeyance pending the outcome of the conference.

Calvin W. Rice Dies; Leader in Professional Affairs

Calvin W. Rice, secretary of the American Society of Mechanical Engineers, dean of the engineering societies secretariat in the Engineering Societies Building, New York, died at the Murray Hill Hospital, New York, Tuesday night Oct. 2, following a cerebral hemorrhage which occurred while in his office during the afternoon.

Mr. Rice was born in Winchester, Mass., in 1868 and graduated from Massachusetts Institute of Technology in 1890. He was in electrical and mining engineering work until his appointment to be secretary of the American Society of Mechanical Engineers in 1906.

Mr. Rice was best known in the civil engineering field for his active interest in interprofessional affairs and in engineering education.

Personals

O. F. GOETZ, chief engineer of the Tennessee state highway department, will serve as acting highway commissioner until the governor announces the successor to Frank W. Webster, recently resigned.

MAJOR R. G. MOSES, Corps of Engineers, has been assigned to the position of secretary of the Mississippi River Commission, Vicksburg, Miss., and assistant to the president of the Mississippi River division.

L. LEE, director of the Chinese government's seismological station near Peiping, has arrived to spend six months at the station of the California Institute of Technology to study the latest developments in this science in this country.

CHARLES G. GROVE, superintendent of the Wilkes-Barre division of the Pennsylvania Railroad, has been promoted to superintendent of passenger transportation of the eastern region with headquarters in Philadelphia. SAMUEL R. HURSH, division engineer of the Pittsburgh divi-

sion, has been named superintendent to fill the position vacated.

EDWARD V. W. CORNEY, employed for the past five years by the Sanders Engineering Corp., Portland, Maine, on hydroelectric construction work in this country, is now located in Bogota, Colombia, S. A., for the same company, which holds the contract for building the La Regadera dam for the water supply of Bogota.

ROY W. CARLSON, for the past four years research engineer at the University of California and active in the cement and concrete research for the Boulder Dam investigation, has been appointed assistant professor of civil engineering at the Massachusetts Institute of Technology.

ROLAND P. PYNE has been appointed regional engineer for the FERA to supervise work in Louisiana, Mississippi, Arkansas, Texas and Oklahoma. Following work with the PWA in Louisville and at Washington headquarters, he has been serving as temporary supervisor in the Midwest territory.

Obituary

JAMES P. ROE, director of research and engineering of the Reading Iron Co., died Sept. 14. He was 74 years of age.

J. L. WOODWORTH, construction engineer of the Texas relief commission, died Sept. 23, at Madisonville, where he was superintending construction of a dam. He was 59 years of age.

WILLIAM E. BALDWIN, head of a contracting organization in Buffalo, N. Y., and a well known highway contractor in that region, died Sept. 27 at the age of 77.

WILLIAM TATE LOWRANCE, head of the Lowrance Bros. Construction Co., which has constructed a large volume of Mississippi River levee work during the past 30 years between Cairo and New Orleans, died in a hospital at Lake Village, Ark., Sept. 27, age 64.

W. L. WEBSTER, for nine years city engineer of Kingsport in eastern Tennessee, died Sept. 27 at the age of 44 as the result of injuries received when he fell over a cliff while inspecting the water supply system. He was a graduate of the University of Mississippi in 1910.

CONSTRUCTION STATISTICS OF THE WEEK

ENGINEERING construction awards for the week total $25,356,000 of which $4,305,000 is for federal work, $15,860,000 for state and municipal, and $5,191,000 for private awards. These totals represent a gain of over 100 per cent over the preceding week in private contracts and a recession in public awards of 16 per cent.

For the first time this year the comparison with a year ago is unfavorable. Construction has moved up into the period when high federal and state highway awards last year turned the new construction curve sharply up. Federal awards, for example, averaged $15,604,000 per week last October compared with $4,305,000 this week and the previous 4-weeks' average of $4,256,000. State and municipal awards this year are running slightly ahead of last year, private contracts behind.

Highway awards dropped back to $6,518,000 this week; earthwork, irrigation and waterways to $3,583,000; waterworks to $803,000; bridges to $1,597,000. Public buildings at $5,175,000 are only slightly below last week. Industrial building awards jumped 180 per cent to $2,757,000 and commercial building awards are up to $1,678,000, sewerage to $1,493,000.

The larger contracts for the week include Chevrolet assembly plant, office and service buildings at Baltimore, Md., $1,228,000; office building for California Fruit Growers Assn., Los Angeles, Calif., $1,000,000; highway lettings by New York $1,058,000, by Georgia $630,000, by Montana $604,000, by Illinois $951,000; Nine Springs Sewage Treatment Plant, Madison, Wis., $442,000; 13-mi. section All American Canal, $1,000,000, force account.

New capital for the week is higher due principally to loans by the RFC to Los Angeles for the work of Metropolitan Water District, $15,000,000, and for flood control, $1,000,000. State and municipal bond sales at $1,818,000 are low. The net increase for the week in PWA allotments outstanding is $3,784,000.

CONTRACTS
(Thousands of Dollars)

	Weekly Oct. 1933	Average Prev. 4 Weeks	Week Oct. 4 1934
Federal Government	$15,604	$4,256	$4,305
State and municipal	14,065	15,020	15,860
Total public	$29,670	$19,277	$20,165
Total private	5,733	4,333	5,191
Week's total	$35,405	$23,610	$25,356
Cumulative to date:			
1933	$716,342	1934	$977,884

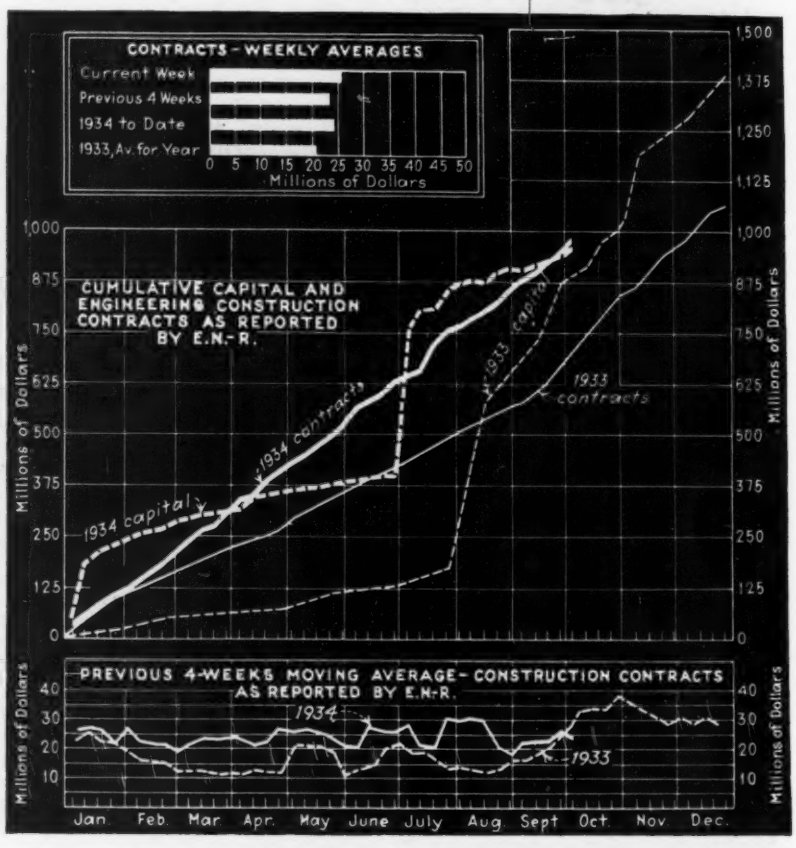
NEW PRODUCTIVE CAPITAL
(Thousands of Dollars)

1934	Week Oct. 4	Cumulative
State and municipal	$1,818	$256,104
PWA allotments, S&M	3,784	694,774
RFC loans, S&M	16,000	25,463
Corporate issues	125	18,206
PWA allotments, private		57,022
Total, Non-Federal	$21,727	$961,569
PWA allotments, Federal Constr.	1,165	193,776
Total new capital	$22,892	$1,155,345
Cumulative to date:		
1933	$894,102	1934	$961,569

Note: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for Federal construction.

INDEX NUMBER

E.N.-R. Cost	1913 = 100	1926 = 100	E.N.-R. Volume	1913 = 100	1926 = 100
Oct., 1934	200.86	96.55	Sept., 1934	101	44
Sept., 1934	200.58	96.41	Aug., 1934	94	42
Oct., 1933	187.74	90.24	Sept., 1933	122	...
1933 (Av.)	170.18	81.80	1933 (Av.)	102	45
1932 (Av.)	156.97	75.45	1932 (Av.)	127	56
1931 (Av.)	181.35	87.17	1931 (Av.)	220	96.5



Construction Equipment and Materials

New Saw For Cutting Metal Uses Electric Arc

The Rich Manufacturing Co., Ltd., Los Angeles, Calif., announces the Strobel electric arc saw, which operates by employing the heat of the electric welding arc and a rapidly rotated circular saw blade of soft alloy steel. Molten metal is taken from the scarf as the cut is made.

In operation, an electric arc, formed between the teeth of the saw blade and the material to be cut, heats the metal directly in the saw's path to a plastic condition so that the pressure created by the saw blade

Strobel Electric Arc Saw

can clear the metal from the scarf. Due to the fact that the blade rotates in a magnetic field and through other principles in the machine's construction, the electric arc is concentrated on the material directly in front of the teeth, and since the speed of travel through the material to be cut is high, the arc is concentrated at any given point for only a short period of time. Therefore, a shallow overheated area, not over 0.003 in. in depth, is produced at the sides of the scarf and the saw blade remains comparatively cool.

New Corporation Manufactures Rock Drill Dust Collectors

The St. Joseph Lead Co. and the Kelley-Atwell Development Corp. have announced the organization of the Kadco Corporation for the manufacture and sale of rock-drill dust-control units developed by George S. Kelley and perfected by use on several large rock excavation contracts in New York City. The apparatus, built in various sizes to handle dust from one drill or forty, consists of a suction unit, operated by a fan or air jet, containing filters and traps to catch all dust, connected by hose to a hood fitting over the drill steel. The units are suitable to down drilling, drifting and stoping in open rock excavation, mines and tunnels. By controlling the dust caused by rock drilling, the apparatus is regarded as a preventative of rock dust diseases, including silicosis. The Kadco Corp. has established headquarters at 30 Rockefeller Plaza, New York City.

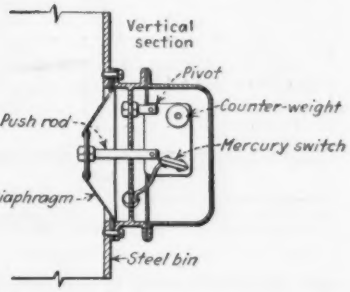
Bin-Level Indicator

A device for indicating the level of materials kept in bins or hoppers is announced by the Ripley Manufacturing Co., Wayne, Mich. The new bin-level indicator is designated as the Bin-Dicator. The maker says that it is applicable to the handling of cement, lime, gypsum, sand, gravel, coal and other types of pulverized or granular material.

The operating mechanism consists of a canvas diaphragm which actuates a counterweighted lever, which in turn operates a mercury switch. When the material exerts a pressure at the point where the Bin-Dicator is mounted, the canvas diaphragm moves outward and operates the mercury switch. When the pressure is relieved, the counterweight forces the diaphragm back to its normal position, reversing the operation of the switch. The mercury switch may be used to operate signal lights, alarm bells, or control equipment.

The device requires an 8-in. hole in the bin wall, over which the Bin-Dicator is fastened.

Ripley Manufacturing Co.'s Bin-Dicator



New Equipment in Brief

Rock Drill. A new heavy sinker drill has been introduced by the Chicago Pneumatic Tool Co., New York, N. Y., and is designated CP-52. This new 3-in. drill is offered for heavy sinking, particularly in hard ground, long-hole quarry drilling and in broken formations where fast drilling, strong rotation and good hole cleaning are required. The maker states that the new drill is symmetrical, well-balanced and, being fully cushioned and valve-actuated, maintains drilling speed under varying air pressure and does not fog with wet air.

Diesel Engine. Hercules Motors Corp., Canton, Ohio, announces an addition to its line of 6-cylinder diesel engines in model DRXB. This engine develops 120 hp. at 2,000 r.p.m. and a maximum torque of 340 ft. lb. The torque curve is exceptionally flat, varying but 40 ft. lb. from 600 r.p.m. up to 2200 r.p.m.

Mobile Crane. A new mobile crane has recently been announced by Bucyrus-Erie Co., South Milwaukee, Wis. This crane, designated the CT-50 Loadmaster Crane, is powered with a Caterpillar 50 gasoline or diesel engine, and is mounted on modified Caterpillar tracks. It is provided with a 30 ft. boom and swings through an arc of 240 deg. The lifting capacity is 13,900 lb. at 12 ft. radius.

Geared Motor. A new geared motor with many available speeds has been developed by the U. S. Electrical Manufacturing Co., Chicago, Ill. The device is a self-contained unit embodying an electro-mechanical power conversion which changes the fixed constant speed of the motor to variable speeds at the take-off shaft. It is called the U. S. Varidrive motor.

Tractor. The Trackson Co., Milwaukee, Wis., announces the Model GL Trackson-Case crawler-tractor. The unit is powered by the Model L Case motor, weighs 8000 lb., and develops 40 drawbar horsepower. Designed to work with auxiliary equipment, the tractor has a low center of gravity, wide tread and special balance to provide the best stability with front, rear and side loads.

Business Notes

THE LOUIS ALLIS CO., Milwaukee, Wis., has recently opened a direct factory branch office in the Bona Allen Building in Atlanta, Ga. The territory served from this office includes North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee and Mississippi.

TIMKEN ROLLER BEARING CO., Canton, Ohio, announces that on June 16, H. H. Timken resigned as president of the company and Wm. E. Umstattd was elected president. Mr. Timken remains as chairman of the board.

ROLLER BEARING CO. OF AMERICA, Trenton, N. J., announces that E. C. Gainsborg has been made general manager.

New Publications

IT PAYS TO OWN A FIREPROOF HOME. 8½x11. 20 pages. Portland Cement Association, Chicago, Ill.

SUPER-DELAVAUD CAST IRON PIPE. 8½x11. 16 pages. United States Pipe & Foundry Co., Burlington, N. J.

THE TUCKERMAN OPTICAL STRAIN GAGE. 8½x11. 8 pages. American Instrument Co., Inc., Washington, D. C.

SEWAGE CLARIFICATION BY VACUUM FILTERS. 6x9. 23 pages. Municipal Sanitary Service Corp., New York, N. Y. Vacuum filter installation at Rockville Centre, Long Island.

BRACKET BEARING SYNCHRONOUS MOTORS. Bulletin No. 1165. 8½x11. 16 pages. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

PEERLESS DEEP WELL TURBINE PUMPS. 8½x11. 48 pages. Food Machinery Corp., Massillon, Ohio.

ELECTRIC TUGGER HOIST. 8½x11. 38 pages. Ingersoll-Rand Co., Phillipsburg, N. J.

DOUBLE SUCTION HORIZONTALLY SPLIT CENTRIFUGAL PUMP. Bulletin 152. 8x10½. 20 pages. Morris Machine Works, Baldwinsville, N. Y.

MACHINERY FOR COMPLETE CRUSHER PLANT. Bulletin No. 1473. 8½x11. 28 pages. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

TERRAZZO. 8½x11. 10 pages. Universal Atlas Cement Co., Chicago, Ill.

CONCRETE BY PIPELINE. 11x16. 24 pages. Chain Belt Co., Milwaukee, Wis. Describing the Rex Pumpcrete system.

LIMA TYPE 701. Bulletin No. 71. 8½x11. 8 pages. The Ohio Power Shovel Co., Lima, Ohio. A 3½-yd. shovel and 30-ton crane.

ADAMS MOTOR GRADER. 8½x11. 16 pages. J. D. Adams Co., Indianapolis, Ind.

TRANSITE PRESSURE PIPE. 8½x11. 18 pages. Johns Manville, New York, N. Y.

BROWN RESISTANCE THERMOMETERS. Catalog No. 9001. 8½x11. 32 pages. Brown Instrument Co., Philadelphia, Pa.

DOW METAL. 8½x11. 64 pages. Dow Chemical Co., Midland, Mich. A light weight magnesium base alloy.

BUSINESS SIDE OF CONSTRUCTION

September Increase Below Year Ago Nine Months Gain 41 Per Cent

THE September volume of engineering construction awards is 11½ per cent behind September last year. The 1934 weekly averages are: public awards, $19,277,000, and private, $4,333,000. Of the public work $4,256,000 per week represents federal awards. Corresponding averages for 1933 are: public, $18,433,000; private, $8,236,000; federal, $6,020,000. Thus the loss is principally in private awards with also lower federal awards. Adjusted for the higher cost index September is 17 per cent below a year ago.

At the end of the 9-month period the status of the various classes of engineering construction reported compared with last year is as follows: total waterworks awards for the nine months are only 86 per cent of last year's total for the same period; sewerage awards are 360 per cent of a year ago; public bridges, 118 per cent; earthwork and waterways, 292 per cent; streets and roads, 171 per cent; public buildings, 187 per cent; unclassified, 430 per cent; total public, 179 per cent; federal, 258 per cent; private bridges, 117 per cent; industrial buildings, 60 per cent; commercial buildings, 82 per cent; unclassified private awards, 86 per cent and total private awards 74 per cent of the first nine months of 1933.

Comparing September with a year ago, streets and roads awards are considerably lower, public buildings are approximately twice as high, industrial buildings are slightly lower and commercial building awards are less than half of September, 1933.

Territorially, New England awards for September double last year's, Middle Atlantic is approximately the same as are South and Middle West, with Far West showing a slight drop and West of Mississippi the major loss from last year's September total.

New Capital

State and municipal bond sales for September averaged $6,557,000, slightly more than the average week to date, $6,520,000. New allotments for PWA financing did little more than to offset rescissions and reductions. Federal allotments from PWA funds increased to an average of $2,891,000 per week for the month. The new capital curve has again crossed the contracts awarded curve and taken a position slightly below it after topping it for two months. The new capital curve, however, is less complete than the new construction curve and normally, its position is below.

Material Notes

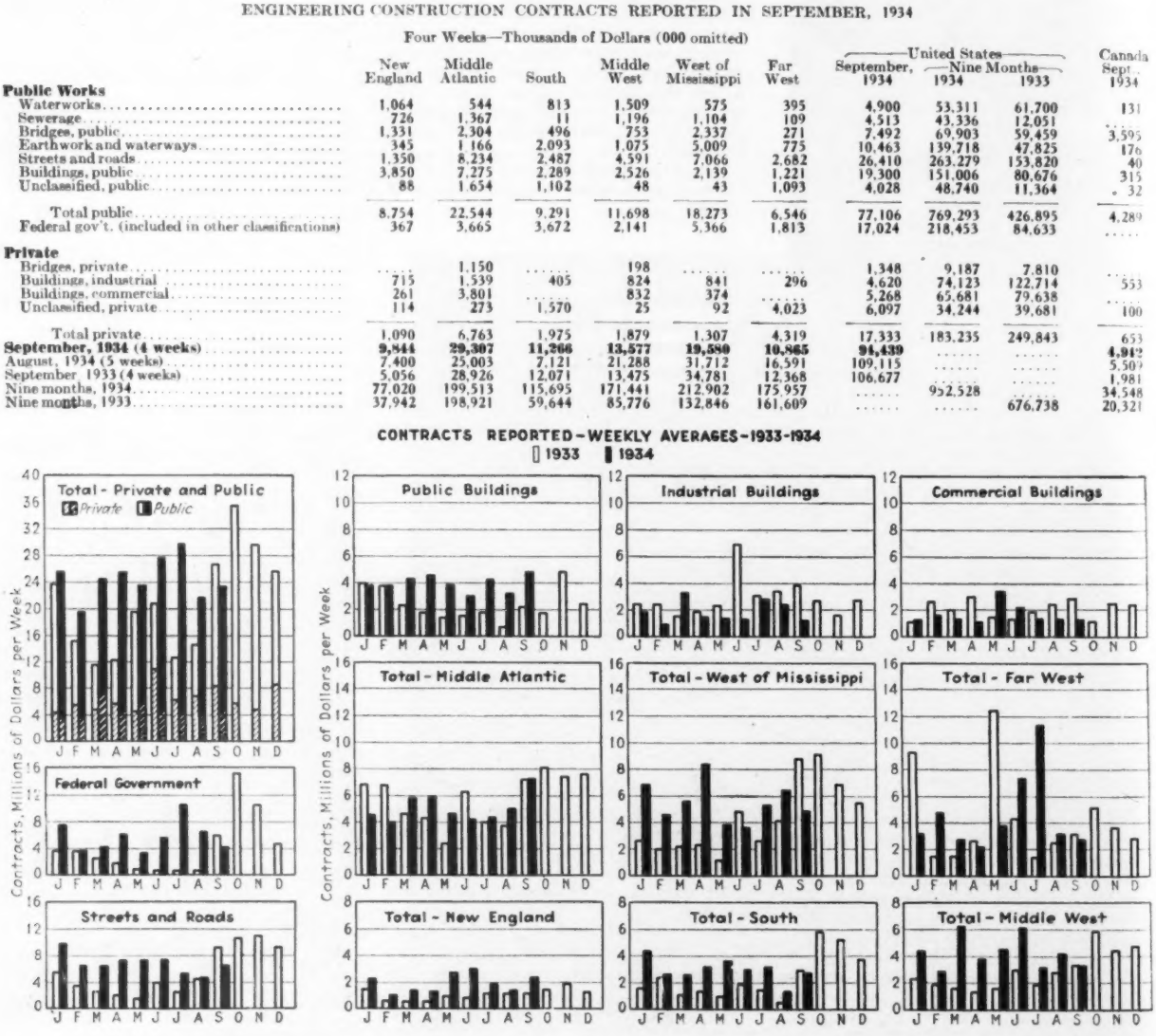
Cement—Portland cement production for August was 7,863,000 barrels, a decrease of 4.4 per cent compared with August, 1933.

ENGINEERING CONSTRUCTION CONTRACTS REPORTED IN SEPTEMBER, 1934

Four Weeks—Thousands of Dollars (000 omitted)

	New England	Middle Atlantic	South	Middle West	West of Mississippi	Far West	United States September, 1934	United States Nine Months 1934	United States Nine Months 1933	Canada Sept. 1934
Public Works										
Waterworks	1,064	544	813	1,509	575	395	4,900	53,311	61,700	131
Sewerage	726	1,367	11	1,196	1,104	109	4,513	43,336	12,051	.....
Bridges, public	1,331	2,304	496	753	2,337	271	7,492	69,903	59,459	3,595
Earthwork and waterways	345	1,166	2,093	1,075	5,009	775	10,463	139,718	47,825	176
Streets and roads	1,350	8,234	2,487	4,591	7,066	2,682	26,410	263,279	153,820	40
Buildings, public	3,850	7,275	2,289	2,526	2,139	1,221	19,300	151,006	80,676	315
Unclassified, public	88	1,654	1,102	48	43	1,093	4,028	48,740	11,364	32
Total public	8,754	22,544	9,291	11,698	18,273	6,546	77,106	769,293	426,895	4,289
Federal gov't. (included in other classifications)	367	3,665	3,672	2,141	5,366	1,813	17,024	218,453	84,633	.....
Private										
Bridges, private	.....	1,150	.....	198	.....	.....	1,348	9,187	7,810	.....
Buildings, industrial	715	1,539	405	824	841	296	4,620	74,123	122,714	553
Buildings, commercial	261	3,801	.....	832	374	.....	5,268	65,681	79,638	.....
Unclassified, private	114	273	1,570	25	92	4,023	6,097	34,244	39,681	100
Total private	1,090	6,763	1,975	1,879	1,307	4,319	17,333	183,235	249,843	653
September, 1934 (4 weeks)	**9,844**	**29,307**	**11,266**	**13,577**	**19,580**	**10,865**	**94,439**	.....	.....	**4,942**
August, 1934 (5 weeks)	7,400	25,003	7,121	21,288	31,712	16,591	109,115	.....	.....	5,507
September 1933 (4 weeks)	5,056	28,926	12,071	13,475	34,781	12,368	106,677	.....	.....	1,981
Nine months, 1934	77,020	199,513	115,695	171,441	212,902	175,957	.....	952,528	.....	34,548
Nine months, 1933	37,942	198,921	59,644	85,776	132,846	161,609	.....	.....	676,738	20,321

CONTRACTS REPORTED—WEEKLY AVERAGES—1933-1934



as reported by the U. S. Bureau of Mines. Shipments totalled 8,297,000 barrels, an increase of 38.4 per cent over last year and of 5.1 per cent over July of this year. The ratio of production to capacity in July declined for the second month in succession to 34.5 per cent compared with 35.7 per cent last month and 35.9 per cent last year. The average for the 12 months ending in August is 26.8 per cent.

Steel—The operating rate of steel companies reporting to the American Iron and Steel Institute (98.7 per cent of the steel capacity of the industry) increased from 18.4 per cent in the first week of September to 24.2 per cent for the last week. Structural steel orders are in part responsible for the increase.

August shipments reported by the American Institute of Steel Construction continued at an increased rate, about 70 per cent larger than the average monthly shipments during the first half of 1934. August bookings of fabricated structural steel recorded a 28 per cent recovery from July, the low point of the summer. This estimate based on reports from 82 per cent of the industry indicates August bookings 14 per cent ahead of the monthly average of the last quarter of 1933, 4 per cent larger than the average monthly bookings of the first quarter of 1934, but 13 per cent less than the monthly average bookings of the second quarter of this year and 5 per cent less than the bookings of August, 1933.

Lumber—During the first 35 weeks of 1934 lumber shipments reported by the National Lumber Manufacturers Association, were 11 per cent below 1933 and orders were 10 per cent below, production was 10 per cent above the corresponding weeks of 1933. Orders were 5 per cent the low point of the summer. This estiproduction.

During September orders booked, shipments and production all declined with shipments showing an upturn in the 4th week. Shipments averaged 197,000,000 feet for the last week of August and first three weeks of September and orders 186,000,000 feet for the same period.

Freight—Public hearings before the Interstate Commerce Commission on the application of the railroads for an incraase in freight rates began in Washington on October 1.

Labor

Report by U. S. Department of Labor, Bureau of Labor Statistics, on "Trend of Employment," indicated an increase of 1.6 per cent in total employment in July, 2.4 per cent in payrolls and .7 per cent in manhours worked. The average hourly earnings increase 1.2 per cent. These figures are based on reports from 11,232 firms engaged in public and private building construction projects not aided by PWA funds.

On PWA construction projects an increase of 30,000 employees is reported for July compared with June. During the month 612,000 persons were working at the site of PWA construction projects. An increase is reported in July of 200,000 workers on the emergency work program of FERA. During the week ending July 26, nearly 1,200,000 people were given employment by the FERA program.

The wage earners employed on the PWA program during July were engaged on the following kinds of work:

	Number of Wage Earners Financed by—		
Type of Project	PWA Federal	PWA Non-Federal	RFC "Self-Liquidating"
Building construction	36,601	28,044	3,083
Bridges	.....	.....	5,359
Public roads	319,345	.....	....
River, harbor and flood control	46,472	.....	....
Streets and roads	11,922*	15,732	....
Naval vessels	16,513	.....	....
Reclamation	13,992	.....	1,991
Railroad construction	.....	35,902	....
Forestry	26,186	.....	....
Water and sewerage	1,460	21,021	4,945
Miscellaneous	17,123	703	2,382
	489,614	102,002	17,760

*Other than those reported by the U. S. Bureau of Public Roads.
These figures are subject to revision.

New York State reports an increase in July over June of 3.0 per cent in construction employment. Building construction employment gained 4.4 per cent, sub-contracting 7.5 per cent, and highway employment decreased .6 per cent in number of employees. Payrolls were 6.3 per cent higher on an average, man-hours worked 5.4 per cent higher, average weekly earnings 3.2 per cent higher and average hours per man 2.3 per cent higher.

Industrial fatalities reported for August by New York State Department of Labor include 13 for construction out of a total of 23 in the service industries.

The Index of Employment in the Production of the Six Major Construction Materials which was temporarily discontinued has been brought up to date by the Federal Employment Stabilization Office. The materials included are: structural steel, cast iron pipe, cement, millwork, steam fittings, and brick, tile and terra cotta. The index from the first of the year follows:

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Unadj.	36.0	37.9	39.1	41.6	44.1	44.4	43.0	42.6
Adj.	38.1	39.9	40.3	41.5	43.2	43.1	41.6	41.1

Few labor controversies are reported on construction work during September. Work on the new $3,000,000 Rip Van Winkle bridge over the Hudson River at Hudson, N. Y., was halted Sept. 20, when 165 steel workers quit after demanding an increase in wages from $1 an hour to $1.25. The contractor offered $1.10 an hour. Work was on a 30-hour week basis.

In Milwaukee, the Building Trades Council adopted increases in the wage scale: glaziers from 75c. to $1.00 an hour; steamfitters from 60c. to 70c.; strike-off workers, 85c. to 90c. and form-setters, 85c. to $1.00.

At Montreal, wages to be paid journeymen bricklayers, plasterers and masons in the five counties of Berthier, Maskinonge, St. Maurice, Laviolette and Three Rivers, have been set at 70c. an hour. The agreement is from Sept. 15, 1934, to the same date 1935.

At Washington, D. C., on Sept. 10, Building Laborers Local, No. 74, asked an increase from 45 to 60c. an hour for laborers on all new work starting after that date.

EN-R Cost and Volume Index

The *Engineering News-Record* Construction Cost Index for August is 200.86. This slight increase is due to an increase in the common labor wage rate average. The same situation on lumber prices exists as that reported last month.

INDEX NUMBER

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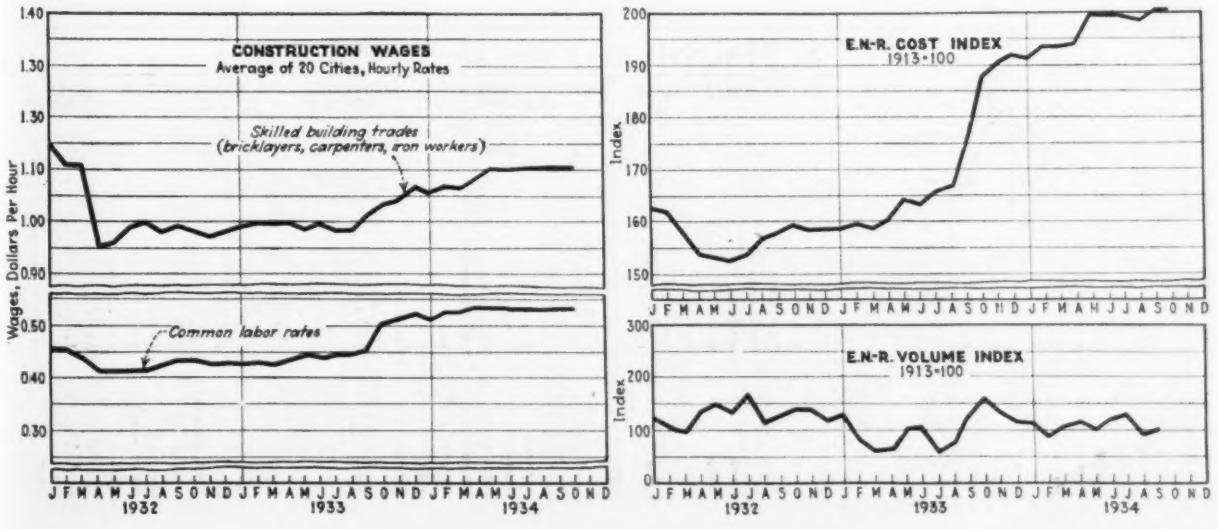

CURRENT PRICES OF CONSTRUCTION MATERIALS

CEMENT, AGGREGATES AND READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT — Per bbl., carload lots, including 40c. per bbl. for bags, cash discount not included			SAND AND GRAVEL — Per ton, carload lots			CRUSHED STONE — Per ton, carload lots		CRUSHED SLAG — Per ton, carload lots, f.o.b. plant		CONCRETE — Ready Mixed 1:2:4, 50c.y. or more, delivered
	Cloth Bags*	Paper Bags	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	
Atlanta	$2.79	$2.54	$2.34	$2.31	$2.31	$1.64	$1.69	$1.92	$1.80	$1.80	$9.00
Baltimore	2.66	2.41	2.21	1.80‡	2.00‡	1.25‡	1.80‡	1.80‡	2.25	2.25	7.35
Birmingham	2.55	2.30	2.10	1.75	1.75	1.40	.85	.85	.90	1.15	5.45
Boston	2.72	2.47	2.27	1.60	1.60	1.15	1.60	1.60	.....	.....	7.00
Chicago	2.85‡	2.60‡	2.40	2.60‡	2.60‡	2.05‡	2.60‡	2.60‡	.....	.....	.....
Cincinnati	2.57	2.32	2.12	1.20	1.20	1.10	1.80	1.80	.....	.....	6.70
Cleveland	2.45	2.20	.....	1.55	1.55	1.45	1.60	1.60	1.75	1.75	8.85
Dallas	2.45	2.20	2.00	1.55	1.55	1.30	2.00	2.15	.....	.....	6.35
Denver	2.98‡	.....	.....	1.85	.....	1.25	.....	.....	.....	.....	.....
Detroit	2.25	2.00	1.80	1.15	1.05	1.00	1.10	1.10	1.30‡	1.30‡	6.00
Kansas City	2.50	2.25	2.00	.75p	.75p	.65p	1.30p	1.30p	.....	.....	7.00
Los Angeles	2.90	2.62	.....	1.90	1.90	1.40	1.90	1.90	.....	.....	6.70
Minneapolis	2.85	.....	2.40	1.00p	1.00p	.25p	1.00	1.00	.....	.....	6.50
Montreal	.....	1.70	.....	.....	1.50	1.40	.....	1.20	.....	.....	.....
New Orleans	2.42	2.17	.....	1.70	1.70	1.45	.....	.....	.....	.....	7.65
New York	2.90‡	2.65‡	.....	1.50†*	1.50†*	1.00†*	1.75†*	1.85†*	.....	.....	7.25
Philadelphia	2.60	2.35	.....	1.80‡	1.90‡	1.50‡	1.75‡	2.00‡	1.75‡	1.75‡	7.75
Pittsburgh	2.45	2.20	1.60	1.50‡	1.50‡	1.70‡	2.25‡	2.25‡	1.25	1.25	7.00
St. Louis	2.42	2.17	.....	1.75‡	1.75‡	1.75‡	1.71‡	1.71‡	.75§	.75§	7.50
San Francisco	2.72	2.52	2.20	1.35	1.35	1.35	1.50	1.50	.....	.....	7.53
Seattle	2.95	2.70	.....	1.50†	1.50†	1.50†	.....	.....	3.00	3.00	7.00

*10c. allowed for each returnable bag. †Per cu. yd. ‡Delivered. §F.o.b. Granite City, Ill. *Barge lots alongside dock. pF.o.b. plant. s5 tons or more.

CURRENT MAXIMUM NET PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable.

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Alpena, Mich.	$1.65	$1.60	Ironton, Ohio	$1.60	$1.55	North Birmingham, Ala.	$1.75	$1.70
Buffington, Ind.	1.60	1.55	Iola, Kans.	1.70	1.65	Richard City, Tenn.	1.85	1.80
Crestmore, Calif.	1.72	.....	La Salle, Ill.	1.60	1.55	Saginaw, Mich.	1.65	1.60
Dallas, Tex. (Inc. 5c. tax)	1.80	1.75	Limedale, Ind.	1.60	1.55	Steelton, Minn.	1.80	1.75
Hannibal, Mo.	1.60	1.55	Mason City, Ia.	1.70	1.65	Universal, Pa.	1.65	1.60
Hudson, N. Y.	1.75	1.70	Norfolk, Va.	1.76	1.71	Waco, Tex. (Inc. 5c. Tax)	1.80	1.75
Independence, Kans.	1.70	1.65	Northampton, Pa.	1.65	1.60	Wyandotte, Mich.	1.60	1.55

Cash Discounts, Cement, to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount, 10c. per bbl. for payment within 15 days of date of invoice.

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE — PARTITION — Per M, lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE — LOAD BEARING — Per M, lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK — Per M, in quantity, Common backing	Straight hard	LIME — Per ton, in paper, Hydrated finishing	Common hydrated	carload lots Pulverized or lump
Atlanta	$84.27	$89.87	$168.40	$189.50	$243.20	$277.90	$13.22	$13.50	$17.50	$12.10	$12.10
Baltimore	77.50	82.50	154.00	185.00	216.00	267.00	13.00	17.00	16.50	11.00	19.00
Birmingham	84.25	90.00	156.00	180.00	215.00	242.00	15.00	22.50	3.00§	1.75§	2.25§*
Boston	85.30	91.15	171.00	193.50	239.60	273.40	14.50	17.00	17.89	13.05	3.06p*
Chicago	66.00	70.40	132.00	.....	.....	.....	10.20	11.20	18.00	13.40	14.00
Cincinnati	69.95	74.65	139.90	139.90	174.65	199.20	17.50	17.50	15.97	12.48	.....
Cleveland	62.50	66.50	124.50	149.50	188.00	214.75	16.50	16.50	17.20k	14.50k	2.65kp*
Dallas	74.75	80.00	149.00	175.00	191.00	218.00	13.50	28.00	18.20	14.50	.....
Denver	78.50	88.00	141.50	166.50	196.00	225.00	11.50–15.50	21.00–30.00	23.27	16.22	.....
Detroit	63.60	67.80	127.10	230.00	270.00	330.00	11.50	12.50	16.50	14.00	21.06
Kansas City	72.50	75.50	92.00	164.00	168.00	199.00	14.00	23.00	.55‡c	.52‡c	2.25§
Los Angeles	77.50	94.25	134.00*	188.00	232.50	311.50	11.50	14.00	18.70	.....	19.70
Minneapolis	78.25	84.00	143.00	165.00	173.00	240.00	13.10	21.00	25.50	21.00	21.00
Montreal	.....	100.00	.....	.....	240.00	.....	14.75	21.50	22.00	12.75	.....
New Orleans	61.60	65.70	123.20	158.90	196.70	.....	14.50	.....	16.60	12.95	.....
New York	84.00	90.00	135.00*	193.30†	238.80†	295.60†	13.75	.....	20.80	16.00	20.80
Philadelphia	80.50	85.90	161.00	182.50	235.00	272.00	15.00	18.00	16.35	11.25	10.75
Pittsburgh	72.65c	77.45c	145.00c	165.00c	217.00c	250.00c	17.50	22.00	16.69	14.10	16.66
St. Louis	62.00	65.00	120.00	165.00	187.00	214.00	15.00	18.00	.48‡	.38‡	2.80p*
San Francisco	84.00	94.50	225.00	.....*	.....	.....	15.00	18.00	22.50	21.50	2.05p
Seattle	84.00	95.00	180.00	.....	.....	.....	15.50d	15.50	30.00	25.00	3.00p*

*6x12x12 in. †F.o.b. Perth Amboy, N. J. ‡Per sack. §Per bbl., 200 lbs. kLCL. pPer bbl. 180 lbs. cLess 5% cash 15 days. dless $1 cash 15 days. *lump.

ROAD SURFACING MATERIALS—F.O.B. CITY

	PAVING BRICK AND BLOCKS — Granite per M, lots of 50,000, 4x4x8 in.,	Brick per M, 3x8½x4 in., carload lots	Wood per sq.yd., 3½ in., 16-lb. treat,	PAVING ASPHALT — Per ton, less than 80 penetration, Tank car	Drums	ASPHALT BINDERS—FLUXES — Per gal., 80-300 penetration, Tank car	Drums	CUTBACK ASPHALT — Per ton, Tank car	Drums	ROAD OILS — Per gal., Tank car	ASPHALT EMULSION — Per gal., Tank car	Drum
Atlanta	$ 80.00	$35.00	$2.25	$18.20	$23.41	$0.0728	$0.098	$20.45	$27.28	$0.0728	$0.105	$0.105
Baltimore	125.00	44.00	2.25	17.00	22.00	.07	.095	.08†	.115†	.....	.....	.....
Birmingham	125.00	24.00	.....	18.00	23.00	0.778	.1028	.082†	.112†	.....	.....	.....
Boston	85.00	34.00	2.50	16.00	21.00	.075	.10	.09†	.12†	.075	.09	.125
Chicago	138.00	42.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cincinnati	100.00	37.00	.....	18.00	22.00	.09	.....	18.50	.....	.07	.08	.....
Cleveland	100.00‡	32.75	2.95	20.00	24.50	.075	.09	.075†	.049†	.06	.085	.10
Dallas	.....	30.50	.....	13.88	20.30	.057	.082	15.65	21.76	.055	.12	.16
Detroit	.....	37.00	.....	19.67*	24.87*	.....	.....	17.00	22.50	.....	.....	.....
Kansas City	.....	26.00	2.75	13.70	18.70	13.55#	18.55#	.0603†	.0853†	.03	.12	.15
Los Angeles	.....	48.50	.....	10.34	14.50	10.34#	14.50#	10.34	.....	.042	.06	.12
Minneapolis	.....	.....	2.50	18.10	24.60	.098	.098	21.75	34.55	.048	.....	.....
Montreal	.....	110.00	.....	14.00	19.66	.07	.093	19.00	26.50	.07	.125	.155
New Orleans	100.00	35.00	.....	14.50	18.50	.065	.09	.07†	.10†	.....	.....	.....
New York	140.00§	50.00	2.64	17.00	22.00	.07	.095	.08†	.115†	.....	.085	.12
Philadelphia	122.00	45.00	2.25	15.00	20.00	.06	.....	.07†	.10†	.06	.....	.....
Pittsburgh	115.00	40.00	.....	19.00	24.00	.0775	.1125	.086†	.121†	.0675	.....	.....
St. Louis	105.00	35.00	2.00	19.50	24.50	.078	.108	.088†	.118†	.04	.09	.125§
San Francisco	.....	50.00	.....	12.00	18.00	12.00#	18.00#	12.50#	23.00#	.04	.0575	.117
Seattle	.....	47.50	.....	18.00	23.85	18.00#	23.10#	15.00	.....	.03	.1925#	34.20#

Note: Paving asphalt, tank car or boat, f.o.b. Maurer, N. J., per ton, Bermudez, $25.00; Trinidad, $21.00. *Per sq. yd. †Per gallon. ‡4½x6x5½in. §Per ton. §4x5x9-in. Av. [Mexican.

CURRENT PRICES OF CONSTRUCTION MATERIALS

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¼-in. billet,	RIVETS ½-in. structural	WIRE NAILS Base	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle bars	Std. spikes	Tie plates	Track bolts
Birmingham	$1.95	$2.00	.....	.....	.....	$36.375	.....	.....	$2.55	$2.40	$1.90	$3.55
Chicago	1.85	2.10	$3.00	.....	$2.25	36.375	$35.00	$34.00	4.10	3.50	1.90	4.65
Pittsburgh	1.80	2.05	2.90	$2.60	2.15	36.375	35.00	34.00	2.55	2.40	1.90	3.55

IRON AND STEEL PRODUCTS—BASE MILL PRICES, PER 100 LB., CARLOAD LOTS

	STRUCTURAL SHAPES Per 100 lb., base price	REINFORCING BARS Per 100 lb., ¼ in., base price New billet	Rail steel	EXPANDED METAL LATH Per 100 sq.yd., carload lots Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 s.f., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in., No. 6 & 6 wires Per sq.yd	SHEET PILING Per 100 lb. base price
Atlanta	$3.63	$2.48	$2.33	$21.00	$24.00	$1.60	$1.21	$0.153	$2.65
Baltimore	2.90	2.75	2.55	20.00	25.00	1.46	1.12	.132	2.70
Boston	3.52	3.03	2.2125	20.50	24.50	1.50	1.14	.142	2.30
Chicago	3.20	2.10	1.95	22.00	26.00	1.46	1.12	.137	2.25
Cincinnati	3.40	3.25	3.25	25.01	29.50	1.44	1.11	.135	.....
Cleveland	3.16	2.60	2.45	22.00	25.00	1.44	1.11	.135	.....
Dallas	4.00	3.28	3.13	24.50	26.50	1.70	1.27	.161	2.985
Denver	3.92	3.66	.....	24.50	30.50	1.70	1.27	.161	.....
Detroit	3.40	2.885	2.885	24.75†	30.00†	1.48	1.13	.139	2.25
Kansas City	3.68	2.83	2.63	19.50	21.50	1.54	1.17	.145	2.65
Los Angeles	3.10	2.95	.....	23.00	27.50	1.90	1.40	.18	2.50
Minneapolis	3.45	2.82	2.67	22.00	26.00	1.58	1.20	.149	2.55§
Montreal	3.50	3.00	2.75	.....	.....	.....	.....	.....	3.20
New Orleans	.....	.....	.....	19.15	23.00	1.58	1.20	.149	.....
New York	3.37	2.82	2.67	20.00	22.00	1.48	1.13	.139	2.48
Philadelphia	2.005	2.34	2.19	20.00	23.50	1.44	1.11	.135	2.44
Pittsburgh	1.80‡	2.05‡	1.90‡	20.75‡	23.00‡	1.44	1.11	.135	2.15
St. Louis	3.44	2.94	2.79	20.00	22.00	1.46	1.12	.137	2.25
San Francisco	3.55	2.475	2.35	23.00	28.00	1.90	1.40	.18	2.60
Seattle	3.55	3.50	.....	.....	.....	1.90	1.40	.18	.....

‡Base Mill Price. Note: Shapes, bars and piling subject to quantity discounts. §Mill Price plus freight to Minneapolis. †f.o.b. delivered.

PAINTING AND ROOFING SUPPLIES—F.O.B.

	WHITE LEAD Per 100 lb. keg in oil	READY-MIXED PAINT Per gal., drums Graphite*	Aluminum†	Ferric Oxide‡	ROOFING SUPPLIES Carload lots, f.o.b. factory Rolls, slate surfaced, 85-90 lb., per sq	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating, per gal.	Tar pitch, 350-lb. bbl., per ton
Atlanta	$11.50	$1.60	$3.10	.....	$1.99	$1.97	$2.90	$.36	$25.40
Baltimore	11.00	1.40	2.25	$1.90	2.52	2.48	2.48	.455	23.00
Birmingham	11.50	2.35	2.35	1.85	1.95	1.79	.....	.36	23.00
Boston	10.00	1.65	2.60	.04½x	2.15	3.30	3.30	.45	20.00
Chicago	11.00	1.85	2.45	1.30	1.60	1.59x	1.59x	.24	20.00
Cincinnati	11.00	1.40	3.00	1.55	2.40	2.39x	2.39x	.36	21.00
Cleveland	11.00	1.65	2.35	1.30	1.60	2.45x	2.45x	.24	22.00
Dallas	12.00	1.80	2.41	.....	3.15x	2.56½	2.56½	.43	30.25*
Denver	11.75	2.55	.....	.....	2.17	3.00	3.00	.50	30.00
Detroit	9.90	1.35	2.20	1.30	1.75	2.35	2.50	.37	27.00
Kansas City	11.12½	1.85	2.25	1.65	1.75	1.85	2.15	.33	26.75
Los Angeles	10.00	1.60	2.25	2.30	2.00	1.50	.....	.45	.....
Minneapolis	11.12½	.....	.....	.....	1.60	1.79x	1.79x	.29	25.10
Montreal	9.40	1.70	3.45	1.65	2.00	2.62	2.02	1.40§	1.52§
New York	11.00	1.70	2.35	1.48	1.60	1.79x	1.79x	.232	22.00
Philadelphia	9.90	1.50	2.05	1.50	1.68	1.85x	1.85x	.34	2.00
Pittsburgh	11.00	1.05	1.95	.80	1.75	1.65x	1.65x	.38	22.00
St. Louis	11.00	1.85	2.45	1.30	1.60	2.75	2.75	.24	20.00
San Francisco	10.75	1.80	2.75	1.10-2.00	1.89	3.13	3.10	.38	26.00
Seattle	10.75	.....	1.92	.....	3.10	4.50	.....	.50	27.60

*New Jersey State Hwy. Spec. 120M. †ASTM Spec. D266-31. ‡80% maximum ferric oxide. §Per 100 lb. •Per roll, 65 lb. xPer lb. *500-lb. drums.
Note: Red lead dry, same as white lead in oil, red lead in oil 50c higher.

MISCELLANEOUS ITEMS

	WINDOW GLASS Discounts from latest jobbers list, Sept. 15, 1928 Single or Double Thickness A quality	B quality	EXPLOSIVES Per lb. dynamite delivered 50-lb. cases Gelatin 40%	60%
Atlanta	85%	85%	$0.215	$0.2375
Baltimore	90%	92%	.15	.165
Birmingham	88%	90%	.105	120
Boston	88-10-5%	90-10-5%	.17	.1825
Chicago	90%	92%	.....	.....
Cincinnati	87@10%	89@10%	.27	.29
Cleveland	89-10 10%	91-10 10%	.19	.205
Dallas	88%	90%	.155	175
Denver	86%	88%	.1525	.1675
Detroit	87@10%	89@10%	.237	255
Kansas City	89@10%	89@10%	.14	.18
Los Angeles	90%*	90@40%*	.1725†	.1925†
Minneapolis	87%	89%	.17	.185
Montreal	.....	.....	.1875	.2125
New Orleans	88%	90%	.19	.22
New York	89%	91%	.22	.235
Philadelphia	88@30%	90@30%	.....	.....
Pittsburgh	90%	90%	105	.12
St. Louis	90%	92%	.13	.145
San Francisco	90%	90@30%	.1575	.1775
Seattle	90@10%	90@20%	.1425	.1575

*Disc. from list Aug. 1, 1929. †F.o.b. Arsenal

CHEMICALS

Water, sewage treatment, road work, f.o.b., carlots, New York:	
Bleaching powder, in drums, f.o.b. works, per 100 lb.	$1.90
Calcium chloride, 77-80%, flaked, in 400-lb. drums or 100-lb. moisture proof bags, f.o.b. works, freight equalized with points of competition, per ton	19.50
Chlorine, cylinders, per lb. delivered	.05½
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb.	1.35
Soda ash, 58%, in paper bags, per 100 lb	1.20
Sulphate of aluminum, commercial, in 100 lb. bags per ton	27.00
Sulphate of copper, in bbl., per 100 lb.	3.85

PILES

Prices per linear foot, pine, with bark on f.o.b., New York; delivered from barge, 1½ to 2c. per ft. additional:

Dimensions	Points	Length	Short Leaf Barge	Short Leaf Rail	Long Leaf Barge	Long Leaf Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.11	$0.155	$0.12	$0.15½
12 in.—2 ft. from butt	6 in.	50 to 59 ft.	.15	.20	.14	.19
12 in.—2 ft. from butt	6 in.	60 to 69 ft.	.16	.215	.15	.20½
14 in.—2 ft. from butt	6 in.	50 to 69 ft.	.185	.225	.19½	.23½
14 in.—2 ft. from butt	6 in.	70 to 79 ft.	.2025	.225	.23½	.29½
14 in.—2 ft. from butt	5 in.	80 to 85 ft.	.265	.375	.....	.....
14 in.—2 ft. from butt	5 in.	85 to 89 ft.	.305	.442	.....	.....

RAILWAY TIES

	Prices f.o.b., per tie, for carload lots:	6 in. x 8 In by 8 Ft	7 In. x 9 In. by 8½ Ft.
Boston	Oak, untreated	$0.90	$1.25
	Pine, untreated	.90	1.25
	Pine, creosoted	1.35	1.90
New York	Long-leaf sap pine, untreated	.80	1.00
	Mixed oak, untreated	.....	1.00
	White oak, untreated	.75	1.50
	White oak, creosoted	no market	
Birmingham	Southern pine, untreated *6x8x8'6"	.45*	.60
	Southern pine, creosoted	1.00*	1.20
Chicago	White oak, untreated	1.15	1.40
	Oak, empty cell, creosoted	1.50	1.88
	Oak, zinc treated	1.40	1.70
	Southern pine, creosoted	1.35	1.78
Los Angeles	Fir, untreated	.50	.72
	Fir, creosoted	1.67	2.40
Philadelphia	Red oak, untreated	1.15	1.35
	Red oak, creosoted	1.40	1.65
St. Louis	White oak, untreated	1.00	1.45
	Red oak, untreated	.98	1.40
	Red oak, creosoted	1.35	1.90
San Francisco	Sap Pine or cypress, untreated	.78	1.25
	Douglas fir, green, untreated	.45	.63
	Douglas fir, empty cell, creosoted	1.14	1.56
Montreal	Birch or maple, untreated	1.10	1.10
	Birch or maple, creosoted	1.25	1.55

CURRENT PRICES OF CONSTRUCTION MATERIALS

WATER, SEWER AND DRAIN PIPE

	C. I. PIPE	VITRIFIED SEWER PIPE				CLAY DRAIN TILE		CONCRETE SEWER PIPE		WROUGHT STEEL PIPE			
	Per net ton, f.o.b. 6 in. and over*	Per foot, delivered, standard (‡ f.o.b.) 8 in., s.s.	12 in., s.s.	24 in., d.s.	36 in., d.s.	Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	Per ft., delivered; ASTM C 14-24 12 in.	24 in.	Full standard weight. # 1 to 3 in., Black	Butt Weld Galv.	3½ to 6 in., Black	Lap Weld Galv.
Atlanta	$42.00	$0.225	$0.405	$1.4625	$3.25	$80.00	$128.00	$0.55	$1.60	44%	37%	42%	34%
Baltimore	45.50	.24	.46	2.05	6.12	102.00	157.00	.75	2.00				
Birmingham	38.00	.25	.45	1.625	4.660	85.00		.45	1.60	48.939%	37.918%	50.162%†	39.143%†
Boston	45.00	.231	.4455	2.025	5.945	60.10	101.00	.54	2.00				
Chicago	46.50	.28	.54	1.98	5.60	85.00	120.00	.675	2.25	56%	45%	55%	57%
Cincinnati	45.00	.294	.432	1.89	5.74	64.29		.40	1.40	57.33%	46.31%	58.55%	47.53%
Cleveland	46.50	.203	.3915	1.665	5.125	47.25	72.00	.536	2.102	58.4%	48.4%	60.6%	49.6%
Dallas	50.00	.27	.486	1.944		100.00	140.00	.46	1.57	64%	58%	63%	54%
Denver	58.00	.23‡	.415‡	1.73‡						56%	45%	43%‡	57%‡
Detroit	46.50	.28	.54	2.25	6.15	73.25	122.65	.36	1.575	54%	42.3%	52.6%	41.8%
Kansas City	48.00	.32	.57	2.27	4.90								
Los Angeles	46.50	.2825‡	.508‡	2.03‡	5.535‡	115.50	192.50	1.00	2.00	53.57%	43%	53%	42.51%
Minneapolis	48.50	.283	.51	2.04	5.13			.50	1.33				
Montreal			1.10	3.70									
New Orleans	44.00	.275	.462	1.62		50.00		.51	1.69				
New York	45.00	.308	.594	2.64	7.38			.55	2.00	51.88%‡	40.86%‡	53.10%†‡	42.08%†‡
Philadelphia	42.00	.315	.6075	2.70		150.00	230.00			52.37%‡	41.35%‡	53.39%†‡	42.57%†‡
Pittsburgh	48.00	.217‡	.418‡	1.80‡	5.43‡	46.00	82.00	.75	1.75	64%	55%	65%†	56%†
St. Louis	45.00	.27	.486	1.944	3.96	85.00	172.00	.80	2.28	51.51%	40.49%	52.74%	41.71%
San Francisco	46.00	.265	.477	1.908	5.22	105.00	175.00		2.20	52.4%	63.4%	51.1%	64.6%
Seattle	47.50	.35	.63	2.52		85.00	200.00	1.50	1.60	60.3%	51.3%	65.3%	52.3%

*b. & s. class B and heavier, C/L lots. Burlington, N. J. (base) $42.00. Gas pipe and class A, $3 per ton additional, 4-in., $3 per ton additional.

#Discounts from standard list for delivery from warehouse, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.: ¼ in., 8½c; ⅜ in. 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92.
†3½ to 6 in., ‡2½ to 3 in. ‡Resale price to consumer, car load lots shipped from mill.

LUMBER AND TIMBER

		SHORT LEAF YELLOW PINE AND DOUGLAS FIR — Per M ft. b.m., carload lots f.o.b. All Fir planks No. 2 common; Fir timber is No. 1 common. All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. Lengths up to 20 ft.								LONG LEAF Y. P. Per M ft. b.m., C/L lots, f.o.b., merchantable grade up to 20 ft.	
		1x6, S4S	1x8, S4S	2x4, S4S	2x6, S4S	2x8, S4S	2x10 S4S	3x12 Rgh	6x12 Rgh.	12x12, Rgh.	2x12, Rgh.	12x12, Rgh.
Atlanta	Southern Pine	$18.00	$19.00	$21.00	$18.50	$20.00	$20.50	$28.00			$38.50	$40.00
Baltimore	Southern Pine	24.00	25.00	31.00	29.00	30.00	32.00	37.00			53.00	54.00
	Douglas Fir	28.00	28.00	30.00	28.00	29.00	32.00	29.00	$29.00	$29.00		
Birmingham	Long Leaf	18.25	19.25	21.25	19.25	20.25	20.25	42.00			32.00	39.80
	Southern Pine	18.25	19.25	20.00	18.00	19.00	19.00	29.00	29.00	28.00		
Boston	Southern Pine	30.50	32.00	37.75†	39.00†	55.00‡	63.00‡	73.00‡			73.00	73.00
	Douglas Fir	31.25	33.50	38.50	40.25	40.75	41.00	44.00	44.00	44.00		
Chicago	Southern Pine	27.00	28.40	33.50	30.00	31.00	32.50	45.00			54.00	58.00
	Douglas Fir	28.50	29.50	31.75	30.50	30.50	28.50	40.75	41.75	41.75		
Cincinnati	Southern Pine	26.00	27.00	27.50	25.50	26.50	27.50	43.50			43.50	
	Douglas Fir							46.25	46.25	46.25		
Cleveland	Southern Pine	28.50	29.50	31.00	28.00	30.25	30.50	45.00	45.00		46.00	57.00§
Dallas	Southern Pine	26.25	27.00	29.02	26.27	27.92	28.72	42.44			47.55	55.55
	Douglas Fir	29.45	30.53	33.28	30.55	38.64	32.45	44.85	44.85	44.85		
Denver	Douglas Fir		34.50*=	38.50*	37.50*	37.50*	42.50*	48.00*	50.00*	55.50		
Detroit	Southern Pine	26.00	27.50	30.00	27.00	30.00	32.00	37.00			32.00	43.75
	Douglas Fir							43.25	44.25	44.25		
Los Angeles	Douglas Fir	27.00	28.50	28.50	25.00	25.50	25.50	35.00	38.00	34.00		
Minneapolis	Western Pine	44.00*	41.25*	34.00*	31.50*	33.00*	31.50*	50.75*‡				
	Douglas Fir	33.25*	34.50*	36.00*	33.50*	35.00*	37.00*	47.00*	50.75*	50.75*		
Montreal	Spruce	36.00	36.00	30.00	30.00	32.00	34.50	36.00				
	Douglas Fir	48.00	48.00	43.00	52.25	52.25	58.75					
New Orleans	Southern Pine	27.50	28.45	33.20	28.15	30.75	31.95	43.95			45.65	52.75
	Douglas Fir	28.95	31.50	33.90	28.75	32.65	33.95	37.95				
New York	Southern Pine	32.00*	33.50*	37.50*	32.50*	35.00*	36.50*	51.00*			77.50*	77.50*
	Douglas Fir			40.00*	37.50*	38.50*	40.00*	38.25*	40.25*	40.25*		
Philadelphia	Southern Pine	24.50	25.50	27.00	25.50	26.50	27.00	31.00			61.00	59.00
	Douglas Fir			31.00	31.00	31.00	31.00	32.50	32.50	33.50		
Pittsburgh	Southern Pine	26.50	27.75	32.75	29.25	31.75	32.75	41.50			57.50	57.50
	Douglas Fir	33.50	34.50	34.50	33.50	34.00	34.25	46.25	46.25	46.25		
St. Louis	Southern Pine	32.25*	33.75*	35.25*	32.25*	33.75*	33.75*	55.25*			49.00*	71.00*
	Douglas Fir							54.25*	54.25*	54.25*		
San Francisco	Douglas Fir	15.00‡	16.00‡	17.00‡	14.50‡	15.50‡	16.50‡	21.00‡	21.00‡	21.00‡		
Seattle	Douglas Fir	22.50	21.50	21.50	21.00	22.50	22.50	20.00	20.00	22.00		

*Delivered. †Spruce. ‡Long-leafed Y. P. §Norway Pine. ‡Northern Pine. ‡Douglas fir. =Native. ‡At ship's tackle.

CURRENT BUILDING AND CONSTRUCTION WAGE RATES PER HOUR

	Bricklayers	Carpenters	Structural Iron Workers	Hoisting Engineers	Plasterers	Common Labor — Building	Common Labor — Heavy Const.
Atlanta	$0.70/1.125	$0.40/.90	$0.60/1.25	$0.60/1.25	$0.60/1.00	$0.30/.40	$0.30/.40
Baltimore	1.25	1.10	1.37½	1.25	1.25	.45	.45
Birmingham	1.00	1.00	1.00	1.00	1.00	.30	.30
Boston	1.20	.70/1.17½	1.20	.90/1.37½	.90/1.37½	.40/.70	.40/.70
Cincinnati	1.27½	1.02½	1.20	1.07½	1.27½	.45	.40
Chicago	1.50	1.31¼	1.35	1.31¼	1.50	.82½	.82½
Cleveland	1.25	1.12½	1.25	1.12½	1.25	.72	.72
Dallas	1.10	1.00	1.12½	.75	1.25	.40	.40
Denver	.60/1.12½	.60/.87½	.60/.87½	.60/.87½		.50	.50
Detroit	1.25	1.00	1.25	.75/.95	1.25	.50	.50
Kansas City	1.32½	1.12½	1.25	1.12½	1.12	.50/.60	.60/.75
Los Angeles	1.10	1.10	1.25	1.10	1.25	.50	.60
Minneapolis	.90/1.20	.75	.90	.75	.90	.40	.50
New Orleans	1.00	.75	1.00	1.00	1.25	.30/.40	.30/.40
New York	1.50	1.40	1.45/1.65	1.50/1.56½	1.50	.82½	.82½/.93¾
Philadelphia	.75/1.20	.60/1.20	1.00/1.20	.75/1.20	.60/1.20	.30/50	.30/.50
Pittsburgh	.50/1.00	.50/1.00	.50/1.00	.50/1.00	.50/1.00	.35/.50	.35/.50
St. Louis	1.50	1.25	1.47	1.35/1.47	1.50	.78¾	.35/.78¾
San Francisco	1.50*	1.10	1.37½	1.12½	1.25*	.62½	.60
Seattle	1.25	1.12½	1.37½	1.25	1.50	.70	.70
Montreal	0.70	.60	.60	.55	.67	.35	.25

Skilled Avg: (Bricklayers, Carp., Ironworkers) $1.1207. Common Avg. $0.5363 *6-hr. Day

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

O., Massillon—City, election Nov. 6, $1,785,000 waterworks plant. G. B. Gascoigne, Leader Bdg., Cleveland, consult. engr.

Utah, Kanab—Election Oct. 11, to vote on bonds to secure P.W.A. loan of $40,000 for replacing mains and extensions. J. R. Sutherland, Richfield, engr. Noted July 26.

Wis., Milwaukee—City, Dpt. P. Wks. making plans filtration plant, incl. filtration building, 32 sand filters, tunnels, reservoirs, revetment and 65 acres pile foundation, on Lake Michigan opposite Linwood Ave. $4,000,000. **Maturity in Spring 1935.** Alvord, Burdick & Howson, 20 North Wacker Dr., Chicago, Ill., consult. engrs. J. P. Schwaba, city engr.

Calif., Los Angeles—Oct. 31, by Bd. Directors Metropolitan Water Dist., F. E. Weymouth, engr., 300 West 3rd St., constructing cut-and-cover-conduit, precast and monolithic siphons, steel pipe siphons, appurtenant works involving 18.07 mi. conduit, 11.52 mi. siphons, 0.91 mi. outlet channel on Colorado River Aqueduct, Riverside Co.; adv. E. N.-R. Oct. 4. $12,000,000-$15,000,000.

BIDS ASKED

Colorado—Oct. 15 (extended date), by Bd. Water Comrs., Denver, enlarging and lining part of Moffat Water Tunnel Intake Shaft and wye, Gilpin and Grand Counties, and parallels the Moffat Railroad Tunnel on the Denver & Salt Lake R.R., 50 mi. west of Denver. D. D. Gross, City and County Bldg., Denver, engr. Noted Sept. 13.

Ill., Benld—Oct. 9, by City, H. J. Lohmar, mayor, waterworks. $144,000. P.W.A. project. Warren & Van Praag, Inc., Milliken Bldg., Decatur, engrs. Noted July 16.

Ky., Tompkinsville—Oct. 12, by City, waterworks system, incl. Contr. 1, distribution system, filtration and pumping plant, concrete dam and intake structure; Contr. 2, 75,000 gal. or 50,000 gal. steel tank on 100 ft. tower. Est. about $50,000. J. S. Watkins, 610 Citizens Bank Bldg., Lexington, consult. engr. Plans may be examined at office of City Clerk, Tompkinsville, at Builders Exchange of Louisville, 633 South 5th St., Louisville, or at office of consulting engr. Noted July 19.

Mass., Lowell—Oct. 8, by City, T. P. McDermott, supt. Water Dpt., waterworks, incl. constructing 1 m.g. steel standpipe at Lowell Highlands; 600,000 gal. steel standpipe in Belvidere Sect.; 400,000 gal. steel standpipe in Christian Hill Sect.; constructing concrete foundations for above. P.W.A. project. Metcalf & Eddy, Statler Bldg., Boston, engrs. Noted Jan. 25.

Mich., Detroit—Oct. 16, by C. J. Plagens, secy. Dpt. Water Supply, furnishing, delivering, installing 2 flue gas temperature recorders for Boilers 1 and 2, Springwells Station; furnishing, installing window and door screens for laboratory building; furnishing, installing electric load indicators; relaying transmitting elements for 2 long distance pressure gages all for Springwells Station. G. H. Fenkell, 735 Randolph St., genl. mgr. Noted Sept. 7.

Mo., Bolivar—See "Sewerage and Waste Disposal."

Mo., Wentzville—Oct. 12, by W. R. Dalton, city clk., waterworks system, incl. wells, pumps, tank on tower, 2- to 8-in. mains, fire hydrants, valves and boxes. $45,000. Russell & Axon, 4903 Delmar Blvd., St. Louis, engrs. Noted July 12.

N. J., Cape May—Oct. 9, by Mayor and City Council, City Hall, 700,000 gal. elevated steel water storage tank, complete with foundations, connections and appurtenances. **P.W.A.** Remington, Vosbury & Goff, 509 Cooper St., Camden, consult. engrs.

N. J., Chester—Oct. 8, by Boro. J. C. Hoffman, clk., deep well and pump, pump house and 100,000 gal. standpipe. Former bids rejected. P.W.A. project. G. W. Knight, 38 East Parke Ave., Newark, engr. Noted Aug. 30.

Pa., Pennhurst—Oct. 10, by Commonwealth of Pennsylvania, Pennhurst State School, 1 story, 16x29 ft. pumphouse, incl. deep well pump, pneumatic water system, auxiliary control, apparatus, and electrical installation, incl. relocating existing 3-phase, 4,100 volt pole line and bank of transformers, along road, re-arranging existing 3-phase, 4 wire, 2,300-4,100 volt feeder and 3 phase, 3-wire 4,100 volt feed on pole line from power house to new pump house, installing new 3-phase, 2,300 volt feeder on same pole line from power house to new pump house, installing new bank of 10 KVA transformers, furnishing, installing all secondary and primary control and protective equipment and running secondary feeders, brick, steel pumphouse, built-up roof. Dpt. Property & Supplies, Commonwealth of Pennsylvania, Harrisburg, engrs.

Pa., Reading—Oct. 17, by City Clerk, Contr. 66 A, Maiden Creek Tunnel, work under this contract pertains to completion of construction of a water supply tunnel 6 ft. 9 in. interior diam. by 2,800 ft. long, approximately 450 ft. can be constructed by open cut method, the remaining 2,350 ft. must be constructed by tunnel methods. This work was originally let, as Contr. No. 66, in March of this year, but has since been abandoned by contractor. Site of work is in Ontelaunee Twp., Berks Co. The south end of the tunnel is on the left bank of Maiden Creek, approximately ½ mi. east of the Reading-Pottsville Rd., 7 mi. north of Penn St. A. R. O'Reilly, ch. engr. Bureau of Water; adv. E. N.-R. Oct. 4 Noted Apr 12, under "Contracts Awarded."

Ont., Burlington—A. M. Wilson, secy. Water Comn., taking bids water purification and storage plant. G. H. Power, town engr. Noted July 19.

CONTRACTS AWARDED

Ark., Tuckerman—J. N. Hout, Sr., mayor, complete waterworks system, to G. C. McEachin Constr. Co., Southern Bldg., Little Rock, $42,083. Est. $50,000. **P.W.A.** Bids Sept. 25, awarded Sept. 26. Noted Aug. 9.

Ind., Bedford — City, waterworks equipment, electric, to Sanborn Electric Co., 309 North Illinois St., Indianapolis, $2,980*** pumps, to Dayton-Dowd Co., Quincy, Ill., $1,299***and to Ingersoll Rand Co., 360 North Michigan Ave., Chicago, Ill., $2,806. Grand total $7,085. **P.W.A.** Bids Aug. 6. Noted July 26.

Ia., Martelle—City, 6,262 ft. 2- to 6-in. c.i. pipe, 11 fire hydrants, one 2 in. valve box, and one hundred twenty 5 in. taps, 25,000 gal. steel tank on 75 ft. tower, to C. W. Rowland, Des Moines, $11,525. Est. $12,000. **P.W.A.** Bids Sept. 21. Noted Sept. 13.

Mich., Detroit—City, Dpt. Water Supply, waterworks improvements, incl. drainage pump houses, gate houses at Springwells plant and addition to steel framing and roof of coagulation basins at Waterworks Park, to Cooper Little Co., 844 Maccabees Bldg., $29,980 and $4,270 respectively. **P.W.A.** Bids Sept. 11. Noted Sept. 7.

Mont., Bridger—Town, waterworks system, to Lease & Leigland, 1st Natl. Bank Bldg., Great Falls, $44,720. Bids Sept. 10. **P.W.A.** Noted Sept. 6.

Mont., Culbertson—Town, H. Smith, clk., waterworks system, to Three Bros., Lovell, Wyo., $54,185. **P.W.A.** Bids Aug. 25.

Mont., Eureka — Town, constructing water system replacements, 18,300 lin.ft. 4- to 8-in. c.i. pipe, etc., to Nelson Smith Constr. Co., Great Falls, $29,682. **P.W.A.** Bids Sept. 4. Noted Aug. 23.

Neb., Beaver City—Village, furnishing, installing cork insulation, doors and chutes for waterworks, to Armstrong Cork & Insulating Co., Lancaster, Pa., $1,265. Awarded Sept. 20. Noted Jan. 25, under "Contracts Awarded."

Neb., Lincoln—Lincoln Water Wks., general contract iron and manganese filtration plant, to E. Rokahr & Son, 1815 Y St., $167,524. **P.W.A.** Awarded Sept. 19.

N. J., Chester—Boro, J. C. Hoffman, clk., test well, to Layne New York Co., 130 North Bway., Camden, $400.. **P.W.A.** Bids Sept. 7. Noted Aug. 30.

N. Y., Mount Morris—Municipality, water supply, filter equipment, to G. Wilson MacDow and H. W. Hosford, receivers for Norwood Eng. Co., Florence, Mass., $36,375. **P.W.A.** Noted May 31.

N. Y., Niagara Falls—City, mechanical equipment and piping, Contr. 2, to G. Wilson MacDow and H. W. Hosford, receivers for Norwood Eng. Co., Florence, Mass., $81,300. Bids June 26. Noted June 14.

O., Hamilton—City, Director Service, waterworks, Contr. 4, Sect. 13, to Walter S. Rae, Koppers Bldg., Pittsburgh, Pa., $66,418. **P.W.A.** Bids Aug. 31. Noted Aug. 30.

O., Steubenville—City, constructing 350,000 gal. steel water storage tank for sub-division, to Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa., $25,120. **P.W.A.** Bids Sept. 24, awarded Sept. 25.

Okla., Nowata—City, furnishing chlorinator and rebuilding old one, to Wallace & Tiernan, 11 Mill St., Newark, N. J., $1,065***furnishing dry feed machine, to Polygon Appliance Co., Kansas City, Mo., $180***meter recording apparatus, to Builders Iron Fdry., Practorian Bldg., Dallas, Tex., $253***pump and motor, to Worthington Mfg. Corp., 401 Worthington St., Harrison, N. J., $675***sluice gate, to Columbian Iron Wks., 2501 Chestnut St., Chattanooga, Tenn., $135. Grand total $2,308. **P.W.A.** Bids Sept. 10. Noted Aug. 23.

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Federal Government projects are classified under heading denoting type of work and designated by symbol of †

◆

Pa., Reading—City Clerk, altering 18th Ward Standpipe 2 and constructing 18th Ward Standpipe 3, to Pittsburgh-Des Moines Co., Neville Island, Pittsburgh, $43,155. Bids Sept. 5, awarded Sept. 21. Noted Aug. 23.

Tex., Farmersville—City, c/o D. Rike, mayor, constructing dam to afford 550 acre ft. of water storage, pumphouse and installation of distribution system, to J. J. Thompson & W. G. Humphreys, Oklahoma City, Okla., $40,010. Est. $51,000. **P.W.A.** Bids Aug. 24. Noted Aug. 16.

Wis., Kenosha—City, constructing foundation for standpipe and pumphouse, to Roy J. Eikenrode, Kenosha, $13,350***steel standpipe, to Grover Tank & Mfg. Co., East Chicago, Ind., $46,997***booster pump, to Aurora Pump Co., Aurora, Ill., $1,795***pipe, to J. B. Clow & Son, 201 North Talman Ave., Chicago, Ill., $1,453***24 in. gate valves, 16 in. check valves, 12 in. cone valves and 16 in. testing valves, to Chapman Valve Mfg. Co., 835 West Washington Blvd., Chicago, Ill., $13,250***6 in. cone valves, to Golden Anderson Valve Spec. Co., 1234 Fulton Bldg., Pittsburgh, Pa., $450***16 in. gate valves, to Traverse City Iron Wks., Traverse City, Mich., $240***Contr. T. to Josephson & Zimmerman Co., 6104 North 22nd Ave., $7,200. Grand total $84,735. **P.W.A.** Noted Sept. 15.

Ont., Orillia—F. H. Horne, chn. Water, Power & Light Comn., 110 Mississaga St., rein.-con. dam and generator house on Gull River, to Dominion Constr. Corp., 1105 Reford Bldg., 219 Bay St., Toronto. Noted Aug. 16.

Ont., Toronto—Chairman Bd. Control, castings in connection with surge tank construction, to Dominion Wheel & Foundries, Ltd., 171 Eastern Ave.***reinforcing steel, to Hooper-Parr & Sundye, 58 Pelham Ave.***cut stone, to Ritchie Cut Stone Co. Ltd., 159 Bay St. Noted Aug. 2.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Ill., Danville—City made plans 30,000 sq.ft. sludge beds, screen house, diffusion tanks, sludge pump house, administration building, control chambers, etc. $1,000,000. Referendum vote on project Nov. 6. C. DeLeuws & Co., 20 North Wacker Dr., Chicago, engrs. Noted Aug. 16.

Mo., Clayton—St. Louis Co. Sanitary Dist. defeated $5,878,000 bonds for modern sewerage system in general district bounded by Lindbergh Dr., Garvois Creek, Maline Creek and St. Louis city limits, except Shrewsbury, all of Maplewood, eastern strip of Richmond Heights and eastern third of Clayton. $1,349,000 grant allotted by P.W.A., contingent on passage of bond issue. Noted Aug. 30.

N. Y., Falconer—Chautauqua Lake Assn., D. W. Buckmaster, chn., West 3rd St., Jamestown, and Bd. Supervs. Chautauqua Co., Mayville, Ellen Yates Miller, clk., making preliminary plans for sewerage system at southern end of Chautauqua Lake from Lakewood to here with disposal plant in or near Falconer. $750,000-$1,000,000. The Assn. is active in the same but Bd. Supervs. will soon appoint committee or establish sanitary district to hire engineer to prepare plans, etc. **Maturity indefinite.** S. E. Fitch, Falconer, is county engr.

N. Y., Island Park—Plans sewage line extensions and street work. $200,000 allotted by P.W.A. **Maturity in fall.**

†*Federal Government.*

For official proposal advertising see Searchlight Section

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Sewerage, etc. (Continued)

BIDS ASKED

Calif., Oxnard—City bids about Oct. 12, sewage disposal plant, consisting of primary clarifier, digester, pumping station, trickling filter, secondary filter, sludge pump, drying beds, screens, etc., alternate bids on Imhoff tank type plant. $72,000. P.W.A. project. Currie Eng. Co., Andreson Bldg., San Bernardino, engrs. Noted Sept. 6.

Mass., Natick—Oct. 13, by Town, Bd. P. Wks., Middlesex Ave., furnishing, delivering vitr. clay sewer pipe, c.i. pipe, special castings, gate valves, sluice gates, valve boxes, constructing force main, sewage treatment works and outlet drain, trickling system to be used, 2 Imhoff tanks, 2 concrete dosing tanks, rein.-con. box filter beds and sand sludge beds. $174,000. P.W.A. project. F. A. Barbour, 1119 Tremont Bldg., Boston, engr.

Mo., Bolivar—Oct. 9, by City, sewage disposal plant and sewers, $89,000 grant and loan allotted by P.W.A.; also improving waterworks, $34,000 loan and grant allotted by P.W.A. E. T. Archer & Co., 609 New England Bldg., Kansas City, engrs. Noted July 19.

Neb., Lincoln—Oct. 11, by Secretary Trustees of Sanitary Dist. 1, Lancaster Co., Bankers Life Bldg., 1 rein.-con. intercepting sewer at 14th and Salt Creek, near here; constructing 4 structurals, temporary bridge for crossing Antelope Creek, and new channel for Antelope Creek. Scott & Scott, Bankers Life Bldg., engrs.

N. Y., Syracuse—See "Contracts Awarded."

Tex., Houston—Oct. 12, by City, c/o O. F. Holcombe, mayor, constructing storm sewer from 90 in Culvert Crossing at Sta. 71-10 of North MacGregor Way to Chartres St., on Wheeler Ave. from Tierwester to St. Emanuel St., on Cleburne Ave. from Tierwester to Chartres Sts., involving 3,037 ft. 15 in. and 2,331 ft. 18 in. concrete pipe leads, 4,821 ft. 18 in., 1,411 ft. 21 in. and 266 ft. 24 in. concrete sewer, 10,626 ft. 36- to 90-in. monolithic concrete sewers, 4,280 ft. 36- to 90-in. rein.-con. sewer, 30 ft. 36 in. Armco culvert pipe, 155 ft. 54 in. double rein.-con. sewer, 25 cu.yd. extra Class 1, 25 cu.yd. extra Class 2, and 300 cu.yd. extra Class 3 concrete, 25 cu.yd. brick masonry, 200 lb. extra castings, 10,000 lb. reinforcing steel, 100 cu.yd. road gravel, 475 cu.yd. road shell, 55 standard manholes, 10 extra depth, Type A manholes, 15 standard and 82 extra depth, Type B manholes, 74 standard manholes Type D, 153 supplying and setting standard inlet, Type B, etc. P.W.A. project. J. M. Nagle, Houston, engr.

Tex., Houston—Oct. 12, by Mayor and City Council, 22,000 ft. 15- to 98-in. rein.-con. sewers in Washington Terrace Section. $236,000. P.W.A. financed. J. M. Nagle, City Hall, city engr.

CONTRACTS AWARDED

Ia., Sac City—City, complete sewage disposal plant, incl. auxiliary piping, connecting sewers, to Lippert Bros., Boone. $48,089. Est. $50,736. P.W.A. Bids Aug. 31. Noted Aug. 2.

†Kan., Fort Riley—Con. Q.M., Marshall Field, drainage system at Marshall Field, to D. Walters, Manhattan, $2,000. Bids Sept. 5. Noted Aug. 30.

Md., Cumberland—City Comrs., City Hall, Contr. 1, intercepters, to R. Lombardi, Latham Park, Phila., Pa., $237,665. Est. $300,000. P.W.A. Bids Sept. 24. Rejected bids Contr. 2. Noted Sept. 20.

Mont., Bridger—Town, constructing 16,500 lin.ft. 8 and 12 in. sewer, manholes, septic tank, filter bed, to Lease & Leigland, 1st Natl. Bank Bldg., Great Falls, $28,244. P.W.A. Bids Sept. 10.

N. Y., Loyd—Town, sewers and appurtenances, Sect. 1, to L. Petrossi & Sons, Inc., 530 Weth Ave., Hartford, Conn; sewage treatment works, Sect. 2, to Suburban Eng. Co., 15 West 38th St., New York. $29,626. P.W.A. Bids Sept. 17. Noted Sept. 13.

N. Y., Brooklyn—R. V. Ingersoll, pres. Brooklyn Boro, Boro Hall, sewers in Avenue L, to P. Tomasetti Contr. Co., 1074 60th St., $181,-200. Bids Sept. 19. Noted Sept. 13.

N. Y., Geneva—Bd. P. Wks., outfall sewers, to C. W. Wood, 232 Delaware Ave., Buffalo, $25,-655. P.W.A. Bids Aug. 2. Noted July 26.

N. Y., Penn Yan—Municipality sewage disposal pumps, to P. A. Florian & H. G. Chapman, receivers for American Well Wks., 100 North Bway, Aurora, Ill., $1,191. Noted May 3.

N. Y., Syracuse—City, sewer in Erie Blvd. from Beattie St. to Thompson Rd., day labor, $350,000. TERA project. A. R. Holmes, ex. dir. Consolidated Wks. Bureau.

Pa., Warren—See "Streets and Roads."

Wis., Madison—Metropolitan Sewer Dist., sewage disposal plant known as Nine Springs Sewage Treatment Plant, Contr. A and B, to Permanent Constr. Co., 735 North Water St., Milwaukee. $376,555***Contr. C, to Graver Tank & Mfg. Co., East Chicago, Ind., $20,060 ***Contr. D, to Chicago Bridge & Iron Co., 1035 West 105th St., Chicago, Ill., $20,980*** Contr. E, to Roat-Connorsville Co., Connorsville, Ind., $24,639. Grand total $442,234. Contr. F, to Wadeford Electric Co., 205 West Wacker Dr., Chicago, Ill. P.W.A. Bids Aug. 23. Noted Aug. 2.

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Wis., Milwaukee—Sewerage Comn., structural steel grating and railings for sewage purification plant, to A. F. Wagner, Architectural Iron Wks., 1483 North Water St., $54,430; return sludge line connection, to Werner Co., 2417 North 68th St., Wauwatosa, $3,200. P.W.A. Bids Sept. 20. Noted Aug. 23.

†Md., Aberdeen—Con. Q.M., sanitary sewer connections and disposal plants for constant temperature magazine, radio house and aircraft range and plate range shop, at Aberdeen Proving Ground, to Cullen, Inc., 1315 H St. N.W., Wash., D. C., $850. Bids Sept. 10.

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Pa., Pittsburgh—P. Wks. Authority, Allegheny Co., E. L. Schmidt, engr. for County P. Wks. program, City Council consents to program and Secretary Ickes has completed plans for loan and grant for Liberty Tubes Plaza, Fort Duquesne Tunnels and Bridge, Homestead High Level Bridge, Highland Park Bridge, Glenwood Bridge, Jerome St. improvement and bridge, North Park Swimming pool, Downtown wharf improvement. $24,165,000.

BIDS ASKED

Illinois—Oct. 6, by Dpt. P. Wks. & Buildings, Div. Hys., Springfield, widening Salem-East Main St. Bridge, rein.-con. girder; constructing I-beam bridge on concrete pipes near Valmeyer. E. Liebermann, ch. hy. engr.

Ill., Streator—See "Streets and Roads."

Ind., Charlottesville—See "Contracts Awarded."

Iowa — Oct. 9, by State Hy. Comn., Ames, constructing bridges on Primary Rd. 48, north of Griswold, NRH-408-F, Cass Co.; bridge and culverts on Primary Rds. 10 and 60, west of Goldfield, Humboldt and Wright Counties; on Primary Rd. 10, from Goldfield west to county line, NRH-NRM-29, Wright Co.; bridges on Primary Rd. 1, NRH-120-D, Jefferson Co.; on U. S. Rds. 20 and 169, Fort Dodge, NRM 475, Webster Co.; culverts on Primary Rd. 33 between Sheldon and Ashton, NRH-NRM-498, O'Brien and Osceola Counties; on Primary Rd. 269, B-868, Van Buren Co., all foregoing P.W.A. projects, 1,000 ft. single cable guard rail, 8 end anchors, on Primary Rd. 4, F-473, Buena Vista Co.; 1,800 ft. single cable guard rail and 16 end anchors, F-379, Cherokee Co.; 4,440 ft. single cable guard rail and 16 end anchors, Primary 10, F-361, Clay Co.; 842 ft. single cable guard rail and 8 end anchors, F-412, Crawford Co.; 2,760 ft. single cable guard rail and 16 end anchors on Secondary Rd., east of Holstein, F-445, Ida Co.; 2,280 ft. single cable guard rail and 10 end anchors, F-420, Lyon Co.; 1,120 ft. single cable guard rail and 8 end anchors, Primary Rd. 37, south of Primghar, F-446, O'Brien Co.; 850 ft. single cable guard rail and 6 end anchors, F-329, Osceola Co.; 200 ft. single cable guard rail and 8 end anchors, on Primary Rd. 12, northeast of Akron, F-417, Plymouth Co.; 2,000 ft. single cable guard rail and 8 end anchors, F-333; 2,506 ft. single cable guard rail and 12 end anchors, Primary Rd. 35, F-413; 2,226 ft. single cable guard rail and 8 end anchors, F-423, all forego ing Sac Co.; 2,430 ft. single cable guard rail and 12 end anchors, F-281, Sioux Co.; 1,570 lin.ft. single cable guard rail and 18 end anchors, U. S. Rd. 75, F-28; 2,470 ft. single cable guard rail and 32 end anchors, Primary Rd. 33, between Alton and Sheldon, both Sioux Co.; 3,980 ft. single cable guard rail and 18 end anchors, U. S. Rd. 75, south of Sioux City, F-404, Woodbury Co. F. E. White, state hy. engr.

New Mexico—Oct. 11, by State Hy. Dpt., Santa Fe, constructing Chama River Bridge, S.P. 100, Rio Arriba Co.; bridges on NRH 155-D, Route 85 between Las Vegas and Springer, Mora Co. G. D. Macy, state hy. engr.

O., Dayton—Oct. 9, by City Manager, repairing superstructure and substructure to bridge over Miami River, 700 cu.yd. concrete, sheet piling, etc. Former bids rejected. P.W.A. project.

South Dakota—Oct. 10, by State Hy. Comn., Pierre, constructing bridges, NRH 58 A, Coddington Co; NRS 320, Edmunds Co.; and NRS 326, Campbell Co.; guard rail in Stanley, Coddington, Custer, Gregory, Tripp, Hanson, Davieson, Turner and Butte Counties. F. D. Kriebs, secy.

CONTRACTS AWARDED

Georgia—State Hy. Dpt., Atlanta, 1 bridge on Atlanta-McDonough Rd., Fulton and De Kalb Counties, to Austin Bros. Bridge Co., 1195 Mickleberry St., Atlanta. $0.192***overhead bridge on Crawford St. Extension in Americus, Sumter Co., to Christian & Manly Constr. Co., Madison. $33,114. P.W.A. Bids Sept. 20. Noted Sept. 13, under "Streets and Roads."

Ill., Chicago—Bd. Local Impvts., City Hall, substructure for bridge over Chicago River, at Ashland Ave., to Underground Constr. Co., 130 North Wells St., $296,331. Total est. $1,713,-000. Noted July 12.

Ind., Charlottesville—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad Street Sta., Phila., Pa., constructing bridge, own forces.

Iowa—State Hy. Comn., Ames, to Forse & Groth, Sioux Center, 27 pipe and 9 box culverts, Dickinson Co. $8,259***to A. Peterson, Tyler, Minn., 6 pipe and 10 box culverts, Hardin Co. $7,324***to Lundgren-Reis, 125 College St., Des Moines, bridges in Harrison and Shelby Counties $29,225; to G. Condon, Grain Exch. Bldg., Omaha, Neb., bridge in same counties, $8,565***to Fort Dodge Constr. Co., Fort Dodge, bridge in Plymouth Co. $12,874***to Hoak Constr. Co., 1007 Hubbell Bldg., Des Moines, guard rail in Bremer Co., $344; in Clayton Co. $6,772; in Floyd Co. $884; and in Hancock Co. $851. Grand total $75,098. Bids Sept. 25. Noted Sept. 20.

Maryland — State Roads Comn., Baltimore, 140 ft. span, steel truss bridge with concrete floor and substructure, approaches, etc. over Catoctin Creek on Middletown-Burkittsville Rd. Contr. F-194-1-59, Federal Aid Project N.H. 81, Unit 1, (1935) Frederick Co., to M. J. Grove Lime Co., Lime Kiln, $53,442; three 63 ft. span steel girder bridge, two 30 ft. clear roadways, over Gunpowder Falls, Phila. Rd relocation, Contr. B-318-2-48, Baltimore Co., to Forbes Murphy Co., 326 St. Paul St., Baltimore, $75,848. P.W.A. Bids Sept. 11.

Mass., Worcester—Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, 90 ft. clear span, through steel plate girder bridge with rein.-con. abutments and 581 ft. bituminous concrete and 607 ft. bituminous macadam approaches, NRM 249, to Coleman Bros., Inc., 245 State St., Boston, $100,307. Bids Sept. 11. Noted Aug. 30.

Minnesota—See "Streets and Roads."

Montana—State Hy. Comn., Helena, 5 timber, concrete bridges and stockpass over south Fork Sun River and treated timber trestle on Augusta-Chouteau Rd., to J. M. Cloverdale & E. O. Johnson, Helena, $15,615 and $5,270 respectively***bridge over Yellowstone River, to W. A. O'Brien, Butte, $86,430***underpass structure, Butte, to F. Dudley, Great Falls, $39,921*** trestles in Daniels Co., to W. Macklin, Brookway, $4,226. Grand total $151,462. P.W.A. Bids Sept. 21.

New York—Triborough Bridge Authority, 111 8th Ave., New York, demolishing buildings on Randalls Island for Triborough Bridge, to World House Wrecking Co., 415 Lexington Ave., New York, $29,250. Bids Aug. 23. Noted Aug. 16.

New York—A. W. Brandt, comr. Hys., Albany, 165 ft. truss bridge, Cattaraugus and Erie Counties, to Holmes & Murphy, Orchard Park, $142,292 est. $163,862***40 ft. I-beam mix method optional approaches 0.34 mi. NRS Cortland-Truxton Part 1, Hy. 738, RC 3558, NRS 748-A, Cortland Co., to Ludke Bros. & Harrington Co., Auburn, $24,616 est. $28,073 ***two 50 ft. skew span stone faced arch bridges, grading approaches, 0.15 mi. LP 34-2, Laurelton Parkway, Queens Co., to P. T. Cox Contg. Co., Inc., 154 Nassau St., New York, N. Y., $146,074 est. $173,917***65 ft. girder mix method type 3 approaches, NRH Parish Camden, Part 1, Hy. 5526, Oswego Co., to Columbia Bridge Constr. Co., Ancram, $38,132. Grand total $351,714.

N. Y., Elmira—Sinclair & Grigg, general contractors, 1518 Walnut St., Phila., Pa., 675 tons structural steel for eliminating grade crossing, to American Bridge Co., Frick Bldg., Pittsburgh, Pa., for Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad Street Sta., Phila., Pa. Noted Sept. 13, under "Contracts Awarded."

Vermont—State Hy. Dpt., H. E. Sargent, ch. engr., Montpelier, reconditioning Williamsburg Bridge, Newfane, to Cement Gunite Co., Allentown, Pa., $7,825; constructing Nash Bridge, New Haven, to F. N. Conant & Son, 275 High St., Newburyport, $20,108. P.W.A. Bids Sept. 5, awarded Sept. 25.

†Virginia—Pub. Rds., Winder Bldg., Wash., D. C., constructing 2 concrete bridges over Wilderness Run and Ni River, in Fredericksburg-Spotsylvania County Battlefields Memorial Park, to G. P. Clay, Richmond, $34,796. Bids Sept. 10. Noted Sept. 6.

STREETS AND ROADS

BIDS ASKED

†Arizona—Pub. Rds., Phoenix, rejected bids Sept. 18, grading, draining 3.046 Payson-Colcord Mount Natl. Forest Rd., Tonto Natl. Forest, Gila Co., $37,433.

California—Oct. 17, by State Hy. Comn., Sacramento, grading 2.5 mi. hy. between Rock Creek and Storrie, Plumas Co.; grading, asphaltic concrete paving 1 mi. hy. between Selma and Fowler Switch Canal, Fresno Co. C. H. Purcell, hy. engr.

California—Oct. 18, by State Hy. Comn., State Bldg., Los Angeles, grading, concrete paving 0.5 mi. hy. in city of Long Beach between Loma and Hathaway Aves., Los Angeles Co. C. H. Purcell, P. Wks. Bldg., Sacramento, engr.

Calif., Alameda—Oct. 16, by City Council, widening Webster St., incl. 5,400 lin.ft. concrete curbing, 4,660 sq.ft. concrete and 1,600 ft. concrete gutters, 20,000 sq.ft. gutter grading, 25,000 sq.ft. 5 in. asphaltic concrete paving, 34,000 sq.ft. 3 in. asphaltic concrete paving, corrugated iron culverts, 250 tons asphaltic surfacing, 250 tons rock screenings; improving

†Federal Government

Streets and Roads (Continued)

Maitland Ave., involving 750 tons asphalt, 1,500 tons base asphalt, 6,900 lin.ft. 2 ft. x 4 ft. header boards, 695 cu.yd. quarry run rock, 92 tons screenings.

Connecticut—Oct. 8, by State Hy. Comn., Hartford, rein.-con. paving 3,918 ft. Southport cut-off, in Fairfield; 11,483 ft. Oyster River cut-off, Old Saybrook, both Federal Aid Projects; grading, drainage, 10,763 ft. Merritt Hy., Greenwich, Docket 5145; bituminous macadam on broken stone paving 26,983 ft. Route 110, Shelton and Monroe, Docket 5514, both FERA projects; 12 ft. span, concrete slab bridge over Roaring Brook on Route 101, Canton, trunk line project; bituminous macadam, asphaltic concrete or cement found macadam paving 5,587 ft. Laurel Rd., Stamford, town project. To exceed $25,000.

Delaware—Oct. 24, by State Hy. Dpt., Dover, laying 18 ft. concrete pavement 1.75 mi. Newark-Milford Cross Rds., Contr. CN 42, 5,000 cu.yd. earth excav.; laying 14 ft. bituminous surface 1.37 mi. Red Lion-Porter Station Rd., Contr. CN 43, 300 cu.yd. borrow excav.; water-bound macadam on Telford stone sub-base and concrete surface course paving, etc. 1.73 mi. Welsh Tract Baptist Church Rd., Contr. CN 44, 2,000 cu.yd. earth, 10 cu.yd. rock and 500 cu. yd. borrow excav.; laying 12 ft. bituminous surface on 1.4 mi. School Lane Rd., CN 45, 400 cu.yd. borrow excav., all foregoing in New Castle Co.; washout repairs 6th St. and Lindbergh Ave., Laurel, Contr. 120 A; 4 ft. widening 6,096 mi. Five Points-Rehoboth Rd., Contr. 391, National Recovery Projects 16 and 23 (1935) 3,200 cu.yd. earth excav.; tar prime and tar seal coat surface treating 4 mi. Zoar Camp Rd., Contr. 382-C, both Sussex Co. W. W. Mack, Dover, engr.; adv. E.N.-R. Oct. 4.

†**D. C., Wash.**—Oct. 10, by Dpt. Agriculture, Pub. Rds., Wash., D. C., grading, curbing, guttering, paving 1.36 mi. North and South Vista Drs., incl. 6,000 cu.yd. excav. H. J. Spelman, principal hy. engr.

Idaho—Oct. 11, by Dpt. P. Wks., Boise, crushed rock or graveling 6.809 mi. North Side Hy. from Eden east, NRM and H 37-G1 Jerome Co., incl. 2,400 cu.yd. solid rock, 91,100 cu.yd. common and 1,300 cu.yd. structure excav. G. R. McKelvey, comr.

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, withdrew bids to have been opened Oct. 4 paving F.A.P. NRS 411A, Henderson Co.; and gravel or crushed stone surfacing F.A.P. NRS 352-B, Shelby Co. Bids Oct. 4, grading 40,240 cu.yd. SA6, Sect. S1A-NRS, F.A.P. NRS 352-B, Shelby Co. E. Lieberman, ch. engr. Noted Sept. 27.

Illinois—Oct. 9, by Dpt. P. Wks. & Buildings, Div. Hys., Springfield, sheet asphalt binder and surface course on concrete surfacing 0.05 mi. East St. Louis approach municipal bridge; concrete paving 0.02 mi. approaches to Chicago & Northwestern overhead, north of Staunton; 0.38 mi. gaps near Golf Rd.; 0.91 mi. south of Rockford; 0.15 mi. approaches to Illinois & Michigan Canal bridge north of Tiskilwa; 0.16 mi. west of Wilsonville; 0.4 mi. approaches to Pennsylvania R.R. overhead east of Greenville; 6.6 mi. Thebes north to Route 146; 2.66 mi. Harrison to Valmeyer and gaps east; 0.84 mi. east of Belleville; 6.11 mi. from Royalton to Mulkytown, E. Lieberman, state hy. engr.

Ill., Streator—Oct. 9, by Dpt. P. Wks. & Buildings, Div. Hys., Springfield, constructing 0.67 mi. Sect. 101V, Route 134, east of Paris, and bridge north of Streator.

Indiana—Oct. 9, by J. D. Adams, chn. State Hy. Comn., Indianapolis, concrete, bituminous concrete, rock asphalt paving 0.23 mi. R-983, Project 193-C-1, Porter Co.; bituminous mulch paving 1.18 mi. Rd. R-984, Project 184-B, Marion Co.

Ind., Fort Wayne—Oct. 10, by Bd. P. Wks., S. Snyder, secy., asphaltic concrete paving 6,600 sq.yd. Harrison St. Labor by FERA men.

Ind., Fort Wayne—Oct. 16, by City, resurfacing Harrison St. J. C. Trier, chn. Bd. P. Wks.

Iowa—Oct. 9, by State Hy. Comn., Ames, paving 0.904 mi. Primary Rd. 14, NRM 63-GHI, Chariton, Lucas Co., incl. 12,783 cu.yd. excav.; bituminous filled brick paving 1.115 mi. U. S. Rd. 6, NRM-206-E, Divs. 2 and 3, in Des Moines, Polk Co., 13,544 cu.yd. excav.; grading 1.062 mi. Primary 10 and 60, west of Goldfield, NRH-351-DE, Humboldt and Wright Counties, 28,533 cu.yd. excav.; 8.347 mi. Primary Rd. 33, from Sheldon to Ashton, NRH-NRM-498-ABC, O'Brien and Osceola Counties, 269,259 cu.yd. excav; 2.841 mi. Primary Rd. 269, P-862, Van Buren Co., 36,037 cu.yd. excav.; 2.541 mi. Primary Rds. 10 and 60 out of Goldfield, west to Humboldt Co. line, NRH-NRM-29-GH, Wright Co., 104,445 cu.yd. excav.; graveling 5.042 mi. Secondary Rd. from Rd. 9 to Minnesota State line, NRS-430, Dickinson Co., 7.418 mi. Primary Rd. 17, NRS-439, Emmet Co.; 11.046 mi. Primary Rd. 150, NRS-402-AB, Greene and Guthrie Counties, all foregoing P.W.A. projects; 4.978 mi. Secondary Rd. east of Holstein, F-445, Ida Co.; 16.879 mi. Primary Rd. 33, F-342, Sioux and O'Brien Counties; gravel or stone frost boil treatment 7.5 mi. M-171, Grundy Co.; 11.4 mi. M-257, Butler Co.; 10.1 mi. M-258, Floyd Co.; 8.2 mi. M-259, Allamakee Co.; 20.5 mi. M-630, Jackson Co.; 13.2 mi. M-631, Iowa Co.; 23.1 mi. M-632, Johnson Co.; 22.6 mi. M-633, Delaware Co.; 10.1 mi. M-383, Dickinson Co.; 8.5 mi. M-384, O'Brien Co.; 7.8 mi. M-385, Sioux Co. F. R. White, state hy. engr.

Kansas—Oct. 9, by State Hy. Comn., at office Garden City, earthwork, culverts, sand gravel surfacing, bridging 3.718 mi. Project 50N-7 NRH 359 A (1935) Hodgeman Co.; earthwork, culverts, sand gravel surfacing 1.001 mi. Project 83-10 NRH 248 B (1935) Scott Co.; earthwork culverts 4.886 mi. NRS 480 B (1935) Seward Co.; earthwork, culverts, bridging 6.013 mi. Project 23-8 NRS 469 C (1935) Lane Co.; earthwork culverts, roadside improvements, bridging 7.062 mi. Project 23-7 NRS 469 D (1935) Finney Co.

Maryland—Oct. 9, by State Roads Comn., Baltimore, bituminous surface course paving 3.37 mi. Contr. B-298-2-48 H169-48 Federal Aid Project NRH 7-A, Units 2 and 7-D, Baltimore and Harford Counties; stabilized earth paving along 1.18 mi. Contr. Wi-131-1-12, Federal Aid Project NRS 352-A (1935), Wicomico Co.; macadam paving 0.68 mi. Contr. M-285-1-52 FAP NRS 33-A, Montgomery Co.; 2.57 mi. Contr. C-153-1-22 Federal Aid Project NRS 342 (1935) Cecil Co.; concrete paving 0.59 mi. Contr. P-168-1-39, Federal Aid Project NRS 345-A (1935), Prince George Co.

†**Maryland**—Pub. Rds., Dpt. Agriculture, 419 Winder Bldg., Wash., D. C., soon takes new bids constructing road in Antietam Battlefield Site, Washington Co. Former bids rejected. Noted Aug. 30.

Mass., Boston—Oct. 8, by City, Dpt. P. Wks., C. J. Carven, comr., sheet asphalt or bitulithic paving ¼ mi. La Grange St., Sect. "A" from Centre to Vermont Sts. P.W.A. project. To exceed $25,000.

Mass., Somerville—Oct. 8, by City, sheet asphalt on concrete paving, ¼ mi. Central St. between Summer St. and Broadway. Part of P.W.A. grant, Docket 8685. To exceed $20,000. Engineering Dpt., office of City Engineer, City Hall, engrs.

Minnesota—Oct. 12, by State Hy. Dpt., St. Paul, grading 2 mi. S.P. 1-166-22-4-A, F.P. 7-G, between points 2 mi. south of Kawishiwi River and 2 mi. southeast, incl. 40,217 cu.yd. excav.; 7.2 mi. S.P. 28-28-26-2 NRH and M 240-A and B, 92,344 cu.yd. excav.; 1.9 mi. S.P. 34-182-21-1, Div. A, NRS 484-B, 42,988 cu.yd. excav.; 4.6 mi. S.P. 95-132-21-1, Div. B, NRS 478-B, 121-363 cu.yd. excav.; grade lift 4.6 mi. S.P. 28-28-28-26-2, NRH and M 240-A and B; bituminous treating 23.7 mi. S.P. 7-66-22-1, 7-66-21-2-A and B, 7-66-21-3, NRH and M 437-B1 and B2, S.P. 7-66-21-4, NRH 437-A, S.P. 7-66-21-5: NRH and M 437-C1 and C2; 2,133 sq.ft. metal cribbing S.P. 61-1-45-2, NRM 429-B.

Minnesota—State Hy. Dpt., St. Paul, rejected bids Sept. 7, surfacing 2.9 mi. State Project 16-9-25, Div. A.

Mississippi—Oct. 12, by E. D. Kenna, dir. State Hy. Dpt., Jackson, alternate types paving 3.768 mi. Senatobia-Como Hy., NRH 55 and 141, (1935) Panola and Tate Counties, involving 2,850 cu.yd. common excav., $77,000; 4.408 mi. Winona-Oakland Hy., NRH 114, Part 3 (1935) Grenada Co., 2,700 cu.yd. common earth excav., $90,000; 5.326 mi. Greenwood, Minter City Hy., Le Flore Co., NRH 205-B (1935), 3,925 cu.yd. earth excav., $100,000; asphaltic concrete paving 0.288 mi. hy. in city of Greenwood, NRM 245-B, Le Flore Co., 250 cu.yd. common earth excav., $11,200; grading, drainage structures, bridging, gravel surfacing 3.556 mi. Marks-Sledge Hy., Quitman Co., NRS 257, 120,234 cu.yd. common earth excav., $80,000, P.W.A. project.

Missouri—Oct. 12, by State Hy. Dpt., Jefferson City, stone or gravel surfacing 5 mi. Route SA, Sect. M11, Route 71 to Fillmore, Andrew Co., 5.9 mi. Route SA, Sect. M11, Route 275-Newpoint Rd., Holt Co.; 8.9 mi. Route SA, Sect. M1, Route 71-Maitland Rd., Nodaway Co.; 12.38 mi. Route SA, NRS 384A1, B1, C1, Route 71-Routh 169, Buchanan Co.; 1.981 mi. Route SA-4, Route 71-Route 169, Clinton Co.; 0.7 mi. Route SB, Route N-Cowgill Rd.; 7.2 mi. Route SN, Route 13-Braymer Rd.; 3.9 mi. Route SJ, Route 36-Route 69, all foregoing Caldwell Co.; 7.1 mi. Route SJ, Route 36-Route 69; 0.6 mi. Route 6, Junction Routes 6 and 13, both Daviess Co.; 0.1 mi. Route 116, in Lathrop and 5.7 mi. Route SA, Lathrop-Tourney Rd., both Clinton Co.; 5.132 mi. Route SD, NRS 490, Route E-Route 6; 3.038 mi. Route SE, NRS 490C, Route D-Santa Rosa Rd.; 8.6 mi. Route 6, Maysville Rd. west; 1.67 mi. Route SJ, Route 6 to Amity Rd., all foregoing DeKalb Co.; 15 mi. Route 4-Stanbury West; 4.6 mi. Route 48, King City-Andrews Co. Rd.; 3.4 mi. Route 85, Albany to Eurona Rd.; 6.9 mi. Route SA, Evorna Rd. S; 10.4 mi. Route 169, Route 4-Worth Co., all foregoing Gentry Co.; 5.89 mi. Route SA, Route 69-Redgeway Rd., Harrison Co.; 15.3 mi. Route 169, Grant City-Iowa Line Rd.; 19.1 mi. Route 46, Sheridan-Grant City; 1.6 mi. Route SA, Route 46-Isadora Rd., all foregoing Worth Co.; 4.245 mi. Route SK, NRS 503A, Maryville-County Farm Rd., Nodaway Co.; 15.6 mi. Route 6, Greencastle-Kirksville Rd.; 4.5 mi. Route SC, Novinger Rd. N., both Adair Co.; 10.8 mi. Route SC, Hartford Rd. S, Putnam Co.; 9.7 mi. Route 4, Livonia-Lancaster Rd.; 1 mi. Route 63, Lancaster Rd. S., both Schuyler Co.; 13.9 mi. Route 5, Milan North; and 1.8 mi. Route 4, Green City-Green Castle Rd., both Sullivan Co.; 21.9 mi. Route 11, Brookfield-Brunswick Rd., Chariton Co.; 5.2 mi. Route 11, Brookfield-Brunswick Rd.; 0.349 mi. Route 5, in Laclede; 5 mi. Route SC, Purdin East, all foregoing Linn Co.; 9 mi. Route 20, Armstrong-Route 24, Randolph Co.; graveling 5.5 mi. Route 6, Trenton-Gate Rd., Grundy Co.; 0.5 mi. Route SM, Route 36-Wheeling Rd.; 3.4 mi. Route SA, Chillicothe Rd. N., both Livingston Co.; 24.8 mi. Route 4, Princeton-West and East; 4.974 mi. Route SB, Goshen Rd. N., both Mercer Co.; 2.5 mi. Route SK, Laddonia Rd. E.; 3.3 mi. Route SA, Route 54-Thru Parker Rd.; 13.5 mi. Route 22, Randolph Co.-Mexico Rd.; 11.5 mi. Route 22, Boone Co.-Mexico Rd., all foregoing Audrain Co.; 1.1 mi. Route SV, Route 22-Sturgeon Rd., Boone Co.; 11.9 mi. Route 4, Scotland-Kahoka Rd.; 5.1 mi. Route SA, Route 4-Wyaconda Rd., both Clark Co.; 15.7 mi. Route 4, Memphis-Lewis Co. Rd.; 6.7 mi. Route SA, Route 4-Gorin Rd., both Scotland Co.; 4.1 mi. Route SF, Route 61-Gregory Landing Rd.; 2.1 mi. Route ST, St. Patrick-Route 96 Rd.; 3.9 mi. Route SZ, St. Patrick-Route 61 Rd., all foregoing Clark Co.; 1.1 mi. Route SB, Newark-LaBelle Rd., Knox Co.; 2 mi. Route SB, Newark-LaBelle Rd.; 9.6 mi. Route SD, Newark-LaBelle Rd.; 11.1 mi. Route ST, St. Patrick-Route 96 Rd.; 16.4 mi. Route 96, Lewistown-Canton Rd., all foregoing Lewis Co.; 9.5 mi. Route SM, Leonard-Route 15 Rd., Shelby Co.; 4.2 mi. Route 15, Scotland Co.-Baring Rd., Knox Co.; 11.3 mi. Route 15-Memphis-Knox Co. Rd., Scotland Co.; 13 mi. Route 47, Troy-Hawk Point Rd., Lincoln Co.; 8.1 mi. Route SD, Louisiana-Ealia Rd., Pike Co.; 0.9 mi. Route 24, Carrollton-Spur; 6.7 mi. Route SD, Norborn North; 0.6 mi. Route SE, Carrollton Rd. W., all foregoing Carroll Co.; 8.2 mi. Route SA, Main City-Archie Rd., Cass Co.; 5.9 mi. Route SC, Route 13-Chilhower Rd., Johnson Co.; 5.3 mi. Route SK, Odessa Rd. S.; 0.503 mi. Route 24-NRM 332 G1, Lexington, both Lafayette Co.; 6.4 mi. Route SB, Holt-Kearney Rd., Clay Co.; 9.8 mi. Route SZ, Route 71-Dearborn Rd., Platte Co.; 4.702 mi. Route SB, NRS 439I, Hallsville-Centralia Rd., Boone Co.; 4.886 mi. Route SH, NRS 494, Stover-Route 5 Rd., Morgan Co.; 1.637 mi. Route SZ, Route TR-Berger Rd., Franklin Co.; 6.016 mi. Route SZ, NRS 419A1 and B1, Gasconade Co.; 7.868 mi. Route SZ, Wentzville-Newville Rd., St. Chares Co.; 7.559 mi. Route 32, NRM 497, Caledonia-Bismark Rd., Washington Co.; 1.069 mi. Route 32, NRH 497D and E, Caledonia-Bismark Rd., St. Francois Co.; 11.187 mi. Route SD, NRS 492B, C, Route 71-Golden City Rd., Bartin Co.; 8.594 mi. Route SB, Rich Hill-St. Clair Co. Rd., Bates Co.; 6.436 mi. Route SH, NRS 394, D1, E1; 3.977 mi. Route SH, Sect. 3A, Jasper-Route B Rd., both Jasper Co.; 8.382 mi. Route SB, NRS 312 A and B, Winona-Alton Rd., Shannon Co.; 5.257 mi. Route 74, Sects. 1B and 2B, Cape Girardeau-Dutchtown Rd., Cape Girardeau Co.; bridges on Route SB, Sect. 2, Rich Hill-St. Clair Co. Rd., Bates Co., over branch, Route 32, NRH 497B, Caledonia-Bismark Rd., Washington Co. T. H. Cutler, state hy. engr.

New Hampshire—Oct. 11, by State Hy. Dpt., Concord, gravel surfacing 11,452 cu.yd. South Mammoth Rd., Manchester, Hillsboro Co., involving 3,795 cu.yd. earth excav., $42,000; 3 in. bituminous macadam on broken stone paving 1,893 mi. New Hampshire College Rd., Newmarket and Durham, Rockingham and Stafford Counties, 2,286 cu.yd. earth excav., $67,000.

New Jersey—Oct. 15, by State Hy. Comn., Trenton, grading, rein.-con. paving 146,481 sq.yd. and bituminous penetration macadam paving 8,486 sq.yd. Route 10, Sect. 5, from Salem St. to Succasunna, Morris Co., incl. 458,059 cu.yd. earth, 16,312 cu.yd. wet and 20,000 cu. yd. rock excav. A. L. Grover, ch. clk.

New Mexico—Oct. 11, by State Hy. Comn., Santa Fe, grading, draining, curbing, guttering, concrete paving 0.929 mi. NRM 27 and NRM 141 and NRH 141, near Gallup, McKinley Co., grading, drainage structures 1.505 mi. NRH 68-A and 5.156 mi. NRH 104, in Sierra Co.; 19.045 mi. McKinley-Valencia Co. line Rd., Valencia Co.; 13.241 mi. NRH 114-A and C, Guadalupe Co.; pit run gravel surface course, bridge, etc. 2.8 mi. NRS 202-B, Valencia Co. G. D. Macy, state hy. engr.

N. Y., Buffalo—Oct. 11, by G. Sunmers, comr. P. Wks., City Hall, repaving Depot, East North, Beech, Vermont, Pennsylvania, Rose and Grape Sts.

N. Y., Jamestown—See "Contracts Awarded."

North Dakota—Oct. 19, by State Hy. Dpt., Bismarck, grading, structures, etc., 9.11 mi. Crystal Rd. West, NRH 437D, Pembina Co., incl. 85,056 cu.yd. earth and 210 cu.yd. rock excav., $31,689; 13.549 mi. north of Niagara, NRH 338H, Grand Forks, 190,184 cu.yd. earth and 1,750 cu.yd. rock excav., $67,224; 8.3 mi. east of Powers Lake, NRH 383B, Burke and Mountrail Counties, 175,218 cu.yd. earth and 9,100 cu.yd. rock excav., $52,955; 4.154 mi. north east cor. 9-134-54 thence south, NRS 485, Ransom Co., 34,319 cu.yd. earth and 100 cu.yd. rock excav., $12,283; 3.21 mi. west of Wolford, NRS 481, Pierce Co., 45,904 cu.yd. earth and 400 cu.yd. rock excav., $12,036; 6.872 mi. Roseglen East Rd., NRH 272A, McLean Co., 77,525 cu.yd. unclassified excav., $20,248; re-gravel surfacing 8.196 mi. des Lac-Berthold Rd., Project 182-1312, Ward Co., $8,000; grading, graveling 5.263 mi. Cleveland Rd. S., NRS 524, Stutsman Co., $6,430; 10.248 mi. Colgate Rd. N.W., NRH 392A and NRM 392C, Steele Co., $14,379***7,014 mi. Bowman Northeast, NRH 21A-Unit 1 and NRM 21A-Unit 2, Bowman Co., $12,000; 10.359 mi. Jessie East and West, NRS 468, Griggs Co., $14,000; 9.807 mi. Alton Rd. East, NRH 440 and 426, Traill Co., $15,807; 8.834 mi. northeast of Walhalla, NRH 441A, Pembina Co., $15,382; 4.873 mi. Dore

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†*Federal Government.*

Streets and Roads (Continued)

North and South, NRS 470, McKenzie Co., $4,729; 8.227 mi. North of Napoleon, NRH 207, Logan Co., $8,732; 9.389 mi. Kindred East, NRH 370F, Cass and Richard Counties, $47,956; 8.562 mi. south of Belfield, NRH 391B, Stark Co., $18,031. Total $361,901. T. G. Plomasen, hy. comr.

North Dakota—Oct. 19, by State Hy. Dpt., Bismarck, graveling and stock piles 9.02 mi. North of Napoleon, NRH 470-B, Kidder Co., $18,530; 10.839 mi. north of Stady, NRH 393-D, Divide Co., 11.929 mi. from Ruder to Douglas, NRH 385-B, Unit 1, NRM 385-B, Unit 2, Ward Co. T. G. Plomasen, hy. comr.

†Oregon—Oct. 12, by Pub. Rds., Post Office Bldg., Portland, grubbing, clearing, grading, culverts on 2.384 mi. Rim Rd.-Crater Natl. Park, Klamath Co. W. H. Lynch, dist. engr.

Pennsylvania—Oct. 11, at office S. S. Lewis, secy. Hys., Harrisburg, bituminous penetration surface on native stone or modified stone base course paving 4.041 ft. R-22036, Lykens Twp., Dauphin Co., involving 4,444 cu.yd. Class 53 cu.yd. Class 2, and 142 cu.yd. borrow excav.; bituminous surface course Spec. E on native stone or modified broken stone paving 14,627 ft. R-39056, Sect. 2, Lynn and Heidelberg Twps., Lehigh Co., 6,077 cu.yd. Class 1, 1,629 cu.yd. Class 2 and 13,485 cu.yd. borrow excav.; rein.-con. paving 4,022 ft. Cottman Ave., Phila., Philadelphia Co., 3,863 cu.yd. Class 1 and 223 cu.yd. Class 2 excav.; bituminous surface, Spec. A on plain concrete paving 2,257 ft. Lancaster Ave., Phila., Philadelphia Co., 6,049 cu.yd. Class 1 and 373 cu.yd. Class 2 excav.; native stone or modified broken stone base with bituminous surface Spec. B, Type 1 or Type 2, paving 14,598 ft. R-53-13, Sect. 1, East and West Brunswick Twps., Schuylkill Co., 39,284 cu.yd. Class 1, 2,508 cu.yd. Class 2 and 1,155 cu.yd. borrow excav.; 13,424 ft. R-53013, Sect. 1-A, East Brunswick Twp., Schuylkill Co., 39,175 cu.yd. Class 1 and 1,619 cu.yd. Class 2 excav.; adv. E.N.-R. Oct. 4. P.W.A. projects.

Pa., Warren—See "Contracts Awarded."

South Carolina—Oct. 16, by State Hy. Dpt., Columbia, clearing, grubbing, scarifying, etc., 0.926 mi. NRS 378-A, Sects. 1 and 2, Pickens Co., involving 23,120 cu.yd. unclassified excav., $15,000; 2.412 mi. NRS 389, Anderson Co., 13,130 cu.yd. common excav. $15,000.

South Dakota—Oct. 10, by State Hy. Dpt., Pierre, grading 11.774 mi. NRH and M 58A, Sect. 1, incl. 532 cu.yd. classified and 161,729 cu.yd. common excav.; 6.238 mi. NRH 58A, Sect. 2, 1.042 cu.yd. classified and 154,832 cu.yd. unclassified excav.; 18.012 mi. NRH and M 58A, 1,574 cu.yd. excav. and 316,551 cu.yd. common excav., all foregoing Coddington Co.; 12.144 mi. NRH 87 and 137, Lake Co., 694 cu.yd. classified and 148,626 cu.yd. common excav.; 5.797 mi. NRS 319, Yankton Co., 978 cu.yd. classified and 95,364 cu.yd. common excav.; 12.343 mi. NRS 320, Edmunds Co., 278 cu.yd. classified and 132,695 cu.yd. common excav.; 8.336 mi. NRS 326, Campbell Co., 1,641 cu.yd. classified and 62,843 cu.yd. common excav.; 4.404 mi. NRS 348 A, Gregory Co., 33,729 cu.yd. common excav.; 4.007 mi. NRS 348 A, Jones Co., 105 cu.yd. classified and 42,875 cu.yd. common excav.; grading 9.854 mi. NRH 186C, Sanborn Co.; 4.546 mi. NRS 298A, Charles Mix Co., 175 cu.yd. classified and 6,656 cu.yd. common excav.; 8.912 mi. NRS 316 and 8.03 mi. NRS 317, both Aurora Co.; 6.998 mi. NRS 323, Hanson Co.; 6.011 mi. NRS 324; 6.953 mi. NRS 334, both Davison Co.; 5.493 mi. NRS 336, McCook Co.; 4.102 mi. NRS 333; 4.991 mi. NRS 338, both Turner Co.; 3.056 mi. NRS 363, Miner Co.; 4.444 mi. NRS 369 and 2.872 mi. NRS 370, both Lincoln Co.; resurfacing 15.335 mi. FAP 169 and SAP 49, Pennington Co.; 15.803 mi. FAP 215A, Stanley Co. F. L. Kriebs, secy.

Tennessee—Oct. 12, by State Hy. Dpt., Nashville, grading, draining, paving 0.533 mi. State Hy. 2, NRH 78-D and NRM 78-E, in Chattanooga, Hamilton Co.; constructing 0.284 mi. Frankewing Underpass and approaches on State Hy. 14, NRH 242-D, Giles Co.; paving 2.868 mi. State Hy. 35, NRH 248-B and D, Sevier Co.; constructing bridge over Nolichucky River and approaches on 0.266 mi. State Hy. 70, NRH 266-D, Greene Co.; grading, draining 1.523 mi. State Hy. 70, NRH 266-E, Greene Co.; 1.23 mi. State Hy. 53, NRS 403-B, Pickett Co.

Virginia—Oct. 16, by State Hy. Dpt., Richmond, improving 0.7 mi. Route 60, State Project NRH-24-FR1, Federal Project NRH-24-Unit 2, Alleghany Co.; macadam paving 0.45 mi. Route 15, State Project NRH-198-DB2, Federal Project NRH-332-C, Loundon Co.; 1 mi. Route 501, State Project NRM-1032-CDE, Federal Project NRM-48-H, in Lynchburg; soil on 6 mi. Route 15, State Project NRH-469-A, Federal Project NRH-364-A, Charlotte Co.; 0.4 mi. Route 4, State Project NRS-682-C2, Federal Project NRS-495-A, Middlesex Co.; graveling 0.48 mi. Route 5, State Project NRM-641-KB3, Federal Project NRM-341-I, in Waynesboro.

Virginia—Oct. 16, by Dpt. Hys., Richmond, sheet asphalt on concrete paving 0.195 mi. Routes 1 and 60, State Project NRM-1035-DE, Fed. Project NRM-9-B, Cowardin and Semmes Aves., Richmond.

Wisconsin—Oct. 16, by State Hy. Comn., Ashford, Crawford and Ozaukee Co. Hy. Comns., Madison, concrete paving 3.804 mi. Mellen-Ashland Rd., (Marengo-White River) Ashland Co., incl. 28,983 cu.yd. earth excav.; 2.773 mi. Milwaukee-Green Bay Rd., U. S. Hy. 141, Ozaukee Co., 18,309 cu.yd. excav., borrow and 140 cu.yd. loose rock excav.; 0.682 mi. Spooner-Superior Rd., U. S. Hy. 53, Washburn Co., 34,955 cu.yd. earth, borrow, marsh excav.; grading, draining 6.674 mi. Stockholm-Pepin Rd., S.T. Hy. 35, N.R.H. 468-B, Pepin Co., 135,129 cu.yd. earth, 6,158 cu.yd. loose rock and 981 cu.yd. solid rock excav.; graveling 6.675 mi. Stockholm-Pepin Rd., S.T. Hy. 35, Pepin Co.; bridge on Augusta-Cadott Rd., S.T. Hy. 27, Eau Claire Co.; 4 bridges on Lynxville-DeSoto Rd., S.T. Hy. 35, Crawford Co.; bridge on Stockholm-Pepin Rd., S.T. Hy. 35, Pepin Co.

B. C., Victoria—See "Contracts Awarded."

Ontario—Oct. 11 (extended date), by R. A. Campbell, deputy minister Dpt. Northern Development, Toronto, clearing, grading, section of Kenora-Fort Frances Hy. from end of existing grade, 30 mi. south of Kenora, southerly a distance of 31 miles.

CONTRACTS AWARDED

†Arizona—Pub. Rds., Phoenix, placing subgrade on 5.039 mi. Payson-Colcord Natl. Rd., Gila Co., to N. G. Hill and J. S. Boyer & Co., Phoenix, $10,925. Est. $10,200. Bids Sept. 11.

Arkansas—State Hy. Comn., Little Rock, grading, minor drainage structures, concrete paving 0.6 mi. hy. near Donaldson, Hy. 67, Sect. 7, Hot Springs Co., involving 61,428 cu.yd. excav., to Kochtitzky & Johnson, Inc., Forrest City, $35,546.

California — State Hy. Comn., Sacramento, bituminous treated selected material surfacing 9.3 mi. hy. between west boundary and 2.4 mi. south of Maricopa, Kern Co., to C. W. Wood, Box 49, Stockton, $42,579. Bids Sept. 12, awarded Sept. 21. Noted Aug. 30.

California—State Hy. Comn., State Bldg., Los Angeles, grading, concrete paving 0.4 mi. hy. through Bloomington, San Bernardino, to Griffith Co., Los Angeles Railway Bldg., Los Angeles, $24,955. Bids Sept. 13, awarded Sept. 26. Noted Aug. 30.

†California—Pub. Rds., 461 Market St., San Francisco, grading road in Plumas Co., to F. C. Cuffe, Box 441, San Rafael, $85,482. Est. $105,963. Bids Sept. 21, awarded Sept. 25.

†California—Pub. Rds., 461 Market St., San Francisco, grading 0.962 mi. road in Eldorado Co., to Hein Bros. Basalt Rock Co., P. O. Box 162, Petaluma, $66,970. Bids Sept. 18, awarded Sept. 22.

†California—Pub. Rds., 461 Market St., San Francisco, grading Sect. G, Route 21, Deer Creek Meadows Natl. Forest Hy. in Lassen Natl. Forest, Tehama Co., to F. C. Cuffe, Box 441, San Rafael, $69,680. Est. $90,595. Bids Sept. 20, awarded Sept. 25.

†Calif., Benton Field—Con. Q.M., concrete paving on roads and paved areas at Benton Field Air Depot, to N. M. Ball, 1889 Yosemite Rd., Berkeley, $48,135. Bids Sept. 11, awarded Sept. 24.

Colorado—State Hy. Dpt., Denver, gravel surfacing 5.2 mi. hy. between Bayfield and Piedra, State Hy. 10, N.R.H. 243-H, (1935) La Plata Co., to H. C. Lallier Contr. & Eng. Co., 6100 West 13th Ave., Denver, $86,113***13,923 mi. hy. through and east of Holyoke on State Hy. 14, N.R.H. 15-F (1935) and 15-G (1935) Phillips Co., to J. B. Bertrand, 5230 Washington St., Denver, $93,460. **P.W.A.** Bids Sept. 17, awarded Sept. 21.

Colorado—State Hy. Dpt., Denver, gravel surfacing 2.166 mi. hy. south of Morrison at Turkey Creek Rd., N.R.H. 29 (1935) and N.R.H. 29-B (1935) Jefferson Co., to W. F. Pigg & Son, Inc., Commonwealth Bldg., Denver, $62,547. **P.W.A.** Bids Sept. 12, awarded Sept. 21. Rejected bids Sept. 12, installing corrugated metal culvert pipes through existing railroad and hy. embankments on hy. east of Vona on State Hy. 4, N.R.H. 135-B, Div. 3 (1935) Kit Carson Co.

Georgia—State Hy. Dpt., Atlanta, to MacDougald Constr. Co., Northside Dr., Atlanta, paving 2.86 mi. Jonesboro-Fayetteville Rd., Clayton Co., $40,884***to Broadbent Constr. Co., Ocala, Fla., 4.545 mi. St. Marys-Kingsland Rd., Camden Co., $44,288***to S. E. Finley, North Ave., Atlanta, paving, 1 bridge 1.492 mi. Hiawasse, Ga.-Hayesville, N. C., Rd., Towns Co., $30,462***to North Eastern Constr. Co., 101 Park Ave., New York, and Winston-Salem, N. C., paving 0.028 mi. road and bridge on 0.229 mi. Atlanta-Newman Rd., Fulton Co., $167,190***to A. Lyons, Rogersville, Tenn., paving 0.366 mi. road and bridge on 0.149 mi. Canton Approach Rd., Cherokee Co., $69,762***to W. F. Bowe, Jr., Augusta, paving 0.962 mi. Georgetown-Cuthbert Rd., Randolph Co., $23,378; surface treating 0.884 mi. Colquitt-Blakely Rd., Miller Co., $14,992; 1.679 mi. connection between Route 4 and Wrightsboro Rd., Richmond Co., $27,764**to G. W. Lakey, Thomson, grading 4.901 mi. road and 1 bridge culvert on Lincolnton-Augusta Rd., Columbia Co., $35,730***to C. M. Lyle Constr. Co., Gainesville, grading, 1 bridge culvert 5.304 mi. Marietta-Atlanta Rd., Cobb Co., $51,963; grading 2.62 mi. Buford-Atlanta Rd., Gwinnett Co., $19,137***to Nichols Constr. Co., La France St., Atlanta, 3.404 mi. Buford-Atlanta Rd., De Kalb and Fulton Counties, $60,308***to Phelps & Milam, Decatur, 3.596 mi. Zebulon-Greensville Rd., Pike Co., $24,116***to E. A. Hudson's Sons, Bolton, 2.267 mi. Douglasville-Fairburn Rd., Douglas Co., $20,352. Grand total $630,335. **P.W.A.** Bids Sept. 20. Noted Sept. 13.

Ga., Rome—City, asphalt paving 0.8 mi. Lindale St. from East 12th to East 20th Sts., to Ledbetter & Johnson, Rome, $26,000. Est. $30,000. G. Wilson, Power Bldg., engr.

Illinois—State, Dpt. P. Wks. & Buildings, Div. Hys., Springfield, paving 1 mi. Jackson and Perry Counties $35,216***1.21 mi. Christian Co., to G. E. Hoffman Constr. Co., Lincoln, $38,883***0.31 mi. Lake Co., to Darrow & Barron, Waukegon, $40,517***0.05 mi. Cook Co to Pickus Eng. & Constr. Co., 38 South Dearborn St., Chicago, $5,110***0.89 mi. Henry, Putnam and Marshall Counties, to Black & Bayles, Walnut, $26,946***8.49 mi. Gallatin Co., to Regenhardt Constr. Co., Cape Girardeau, Mo., $183,587***9.84 mi. Hardin Co., to Harrison Eng. & Constr. Co., Fairfax Bldg., Kansas City, Mo., $237,342***0.78 mi. LaSalle Co., to Trompeter Constr. Co., Peru, $39,892***11.55 mi. Crawford and Lawrence Counties, to R. McCalmar, Inc., Danville, $239,209***0.28 mi. Cook Co., to W. J. Sheppard, Chicago, $80,252***0.91 mi. St. Clair Co., to Webb-Boone Paving Co., 5103 Fyler St., St. Louis, Mo., $17,193***subway in Cook Co., to P. J. Messer Constr. Co., Chicago, $6,162. Grand total $950,000. Bids Sept. 20. Noted Sept. 13.

Ill., Bellville—Dpt. P. Wks. & Buidlings, Div. Hys., concrete paving 0.69 mi. Sect. 122-15D, near East St. Louis, St. Clair Co., to Kelley Bros. Constr. Co., East St. Louis, $26,527. Bids Sept. 7.

Indiana—State Hy. Comn., Indianapolis, grading, concrete paving 13,375 sq.yd. road in Clark Co., to Berns Constr. Co., 309 West Washington St., Indianapolis, $35,712 est. $37,807; bituminous mulch-liquid asphalt on 1.081 mi. road in Boone Co., to L. Marsch, Morrisonville, $2,231 est. $3,044. Bids Sept. 18. Noted Sept. 13.

Iowa—State Hy. Comn., Ames, to L. J. Hartman, Laurens, grading 7.837 mi. Dickinson Co., $17,724***to Union Constr. Co., New York St., Des Moines, 2.894 mi. Hardin Co. $10,478***to Wahl Constr. Co., Victor, graveling 6.918 mi. Cass Co. $9,284***to Sargent Bros., Des Moines, 5.6 mi., Decatur Co. $2,706***to L. J. Peters, Des Moines, 11.486 mi. Guthrie Co., $6,088***to C. A. Emery, Coon Rapids, 4.401 mi. Sac Co. $2,425; maintenance, graveling 70 mi, Sioux Co. $11,401***to Mandlin Constr. Co., Nevada, 70.8 mi. Lyon Co. $6,742; 5.4 mi. Osceola Co. $798***to Hartsell & Evans, Early, 6.1 mi. Plymouth Co., $1,121***to Paul Constr. Co., Fort Dodge, 30.7 mi. Pocahontas Co. $4,932*** to J. H. Hartsell, Early, 24 mi. Crawford Co. $5,881; 18 mi. Cherokee Co. $1,978; 19 mi. Monona Co. $4,670***to Dixon Constr. Co., Mystic, 37 mi. Ida Co. $7,493***to A. L. Albrecht, Storm Lake, 65.65 mi Buena Vista Co. $10,844. Grand total $117,193. Bids Sept. 25. Noted Sept. 20.

Ia., Ames—City, J. W. Prather, clk., curbing, guttering 34,042 lin.ft. various streets, to B. Cole & Sons, Ames, at 87c. per lin.ft., total $29,617, extra excavation 50c. per cu.yd.; extra concrete $14 per cu.yd. in place. Bids Sept. 21.

Kentucky—State Hy. Comn., Frankfort, grading, draining 4 mi. Russellville-Claymour Rd., S.P. 265-AG, Logan Co., and 2.1 mi. Morgantown-Brownsville Rd. S.P. 375-AG, Butler Co., to Ralph E. Mills Co., Frankfort, $22,754 and $26,936 respectively, bids Oct. 24, 1933, and June 14 respectively***5.556 mi. Clinton-Oakton Rd., S.P. 264-AG, Hickman Co., and 3.124 mi. Dukedom-Pilot Oak Rd., S.P. 9-CG, Graves Co., to R .F. Pryor & Co., Mayfield, $27,426 and $18,835 respectively, Bids June 28 and July 12 respectively***1.433 mi. Windyville-Honakers Ferry Rd., S.P. 480-AG, Warren Co., to A. Snider, Danville, $20,090, bids June 28***3.786 mi. Bremen-Millport Rd., S.P. 128-AG, Muhlenberg Co., to J. B. Westerfield, Owensboro, $21,733, bids July 12, all foregoing awarded Sept. 25. Grand total $137,774. Noted June 7, 21 and 28.

Maryland — State Roads Comn., Baltimore, gravel paving 3.11 mi. Contr. Ch-139-1-32, Federal Aid Project N.R.H. 280-B (1935) Charles Co. and 0.44 mi. Contr. SM-147-1-32 Federal Aid Project N.R.H. 278-B (1935) St. Marys Co., to Pembroke & Gasporovic, Park Hall, $48,900 and $3,842 respectively***grading, drainage for dual hy. 1.6 mi. Contr. H-186-48, Federal Aid Project N.R.H. 335-D, Harford Co., to Potts & Callahan, First Natl. Bank, Baltimore, $81,266. Grand total $134,008. **P.W.A.** Bids Sept. 11.

Mass., Boston — City, Dpt. P. Wks., C. J. Carven, comr., City Hall Annex, sheet asphalt paving Old Colony Ave., Sect. "A", to S. J. Tomasello, 15 Bay St., Dorchester, $51,980. Bids Sept. 17.

Michigan—State Hy. Comn., Lansing, grading, shaping, sidewalks, concrete paving 1.474 mi. N.R.H. 70-43C-1 and N.R.M. 70-43C-2, Ottawa Co., to West Michigan Constr. Co., South Haven, $120,653***grading, shaping, drainage, 2 course gravel surfacing 0.647 mi. N.R.H. 69-2C-4, Otsego Co., to Joseph Leach Jr., Saginaw, $31,721***3.264 mi. N.R.H. 41-69-C-1, and N.R.M. 41-69C, Kent Co., to Peninsular Constr. Co., Grand Rapids, $27,612***shaping 5.253 mi. and concrete surfacing and miscellaneous work on 0.232 mi. N.R.H. 39-26C-2 and N.R.H. 39-26C-3, Kalamazoo Co., to Brooks Co., Jackson, $120,929. Grand total $300,915. **P.W.A.** Bids Sept. 14.

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†Federal Government.

Streets and Roads (Continued)

Minnesota—State Hy. Dpt., St. Paul, bituminous treatment 8.6 mi. S.P. 43-43-21-A and B, and 10.1 mi. S.P. 43-43-21-2B, to Megarry Bros., Bain, $51,014 and $56,027 respectively ***crushed stone surfacing 4.4 mi. S.P. 44-44-21-1A NRH and M 147 B1 and 2 and S.P. 44-44-21-1B, NRH 147 A, to Halvorson Bros., Spring Grove, $13,571***Bridge 5396, State Project 61-103-21, to J. Runquist & Son, 2123 Water St., Duluth, $31,977. Grand total $152,589. **P.W.A.** Bids Sept. 14. Rejected bids Sept. 14. plant mix, bituminous surfacing State Project. 59-59-27-2.

Mo., St. Louis—Bd. P. Wks., City Hall, grading new manholes, inlets, concrete paving Carondelet Blvd., to Webb-Boone Paving Co., 5103 Fyler Ave., $40,785. Est. $62,600. **P.W.A.** Bids Sept. 18. Noted Aug. 23.

Montana—State Hy. Comn., Helena, to J. Boesplug & B. Hunt, Miles City, graveling, oiling 0.758 mi. in Harlem and 0.502 mi. in Chinook, $23,811***to Inland Constr. Co., 3967 Leavenworth St., Omaha, Neb., surfacing 26.908 mi. Custer Co., $107,478; 11.203 mi. in Lewis and Clark Co., $107,478; 10.261 mi., Daniels Co., $93,805***to Tomlinson Arkwright Constr. Co., and J. L. McLoughlin, Great Falls, grading 13.118 mi. Augusta-Chouteau Rd., $134,173*** to E. C. Powell, Missoula, 13.985 mi. Granite and Powell Counties, $137,564. Grand total $604,309. **P.W.A.** Bids Sept. 21.

N. J., Little Falls—City, improving roads, to Franklin Constr. Co., 20 Washington Pl., Newark, $29,797. **P.W.A.** Noted Aug. 2.

New York—A. W. Brandt, comr. Hys., Albany, concrete paving 0.76 mi. NRH-RC 3561 Conduit Blvd., Part 5, Hy. 5701-A, NRH 8474, Sunrise Hy. Extension, Part 1, Nassau Co., to Johnson, Drake & Piper, Inc., Freeport, $99,809 est. $105,132***4.06 mi. NRS Holley-Brockport Rd. Part 1, Hy. 5421 and 1.86 mi. Holley-Albion Rd. Part 2, Hy. 5118, NRS 778-A, Orleans Co., to W. J. Gallagher, Medina, $108,062 est., $137,828***2.03 mi. NRM Owego-Campville, Part 1, NRH 530-C and 530-D, Hy. 8475, Tioga Co., to Tyne & Willey, Inc., Binghamton, $89,090 est. $99,220***2.51 mi. NRS Scotia-Saratoga Co. line, Part 1, Hy. 1338, RC 3564, NRS 781-A, Schenectady Co., to Davis & Stearns, Inc., Whitney Point, $88,093 est. $97,038***4.52 mi. NRS Rexford Flats Hamlet, Hy. 1117-A, RC 3563, Rexford Flats-Waits Corners-Groom Corners, Hy. 117, Wait Corners-Lape Corners Hy. 1523 NRS 781-A, Saratoga Co., to S. A. Scullen, Inc., Cohoes, $156,186 est. $192,956***6.9 mi. NRH Phoenix-Pennellville Rd. Hy. 450, R.C. 3567, NRH 654-B, Phoenix-Mexico Rd. Part 2, Hy. 1244, Palero-Mexico Rd. Part 1, Hy. 1526, NRH 654-A, Oswego Co., to Manitou Constr. Co., 183 East Main St., Rochester, $244,276 est. $301,979***preliminary grading 2.27 mi., NRM GCP 34-9, Grand Central Parkway extension, Queens Co., to A. A. Johnson Corp., 27-28 Hunter Ave., Long Island City, $272,458 est. $493,270. Grand total $1,057,974.

N. Y., Jamestown—City, grading, curbing, sidewalks, hard-surfacing Allen St. extension, ERB project, funds allotted; and grading and improving Allen Park, $25,000 or more. L. F. Graham, city engr.

N. Y., New York—J. J. Lyons, pres. Bronx Boro, County Bldg., 161st St. and Concourse, to F. Gabrielle, 2750 Creston Ave., regulating Seward Ave. $2,928***to Ammana Contg. Co., 3206 Webster Ave., Pugsley Ave. $2,242***to Mansbro Contg. Co., 2861 Harrington Ave., Fteley Ave. $1,794***to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., asphalt paving Pitman Ave. $2,925; asphalt block paving East 179th St. $82,507; Jennings St. $51,364; Crotona Park North, $51,159***to St. George Paving Co., 415 Lexington Ave., granite paving East Tremont Ave., $72,208. Grand total $267,127. Bids Sept. 13.

N. Y., New York—J. Lyons, pres. Bronx Boro, County Bldg., 161st St. and Grand Concourse, granite paving West Burnside and Westchester Aves., to Leonard Paving Co., 233 Bway., $150,999 and $94,974 respectively*** asphalt paving Bronx Park East and East 187th St., to Venetian Contg. Co., 2 Lafayette St., $47,774 and $52,287 respectively***East 176th St., to S. P. Contg. Co., 3356 Fenton Ave., $399***grading Netherland St., to M. DelBalso, 2551 Cruger Ave., $1,676***Barkey Ave., to F. Gabrielle, 2750 Creston Ave., $1,829*** Cranford Ave., to Del Mar Eng. Co., 400 East Fordham Rd., $8,321. Grand total $358,259. Bids Sept. 5. Noted Aug. 30.

N. Y., Rouses Point—Village, paving, to Clinton Paving Co., Plattsburg. Est. $35,000. **P.W.A.** Bids Sept. 17.

Oklahoma—State Hy. Dpt., Oklahoma City, grading, drainage, 4.509 mi. Grady Co., 36 ft., to E. Honaker, Clinton, $25,761 est. $27,000; 0.132 mi. Comanche Co., 36 ft., to J. E. Smith, Noble, $4,214 est. $5,000.

Pa., Pittsburgh—Dr. James P. Kerr, controller, City County Bldg., repaving Penn Ave. from 28th to 31st Sts., and repaving Forbes St. from Stevenson to Van Braam Sts., to D. Pavia, 331 Ladson St., Pittsburgh, $38,464 and $25,207 respectively***grading, paving, laying and relaying water lines in North Whitfield St., to Schenley Constr. Co., 40 Boundry St., $9,415. Grand total $73,086. Bids Sept. 18.

Pa., Warren—City, bitulithic or concrete paving Jefferson St. from Conewango Ave. to Prospect St., Madison Ave. from Russell to Grant Sts., constructing new storm sewers in 8 streets and extending flood wall on west side of Allegheny River, day labor under supervision of C. Barvis, city engr., City Hall. To exceed $25,000.

†Tenn., Knoxville—U. S. Eng., asphalt, to Emulsified Asphalt Products Co., Knoxville, $28,200. Work to be done by T.V.A.'s own forces.

Tex., Dallas—City excavating, grading, and placing rock base for pavement on 39 streets, involving 18,000 cu.yd. earth excav., to be done by relief labor, all hauling to be done by days work or per cu.yd. of material hauled, 300 men to be employed and to be under supervision of City Engineering Dpt. Est. $29,800, approximately $5,000 has been deposited by residents, remainder of material costs to be paid by city. Government will meet labor costs. **P.W.A.**

Wash., Waterville—Douglas Co., grading 4.88 mi. Secondary Hy. 10, Leahy-South Rd., and 3.45 mi. Secondary Hy. 9, Alston-East Rd., to L. Colucci & Co., 1643 Lane St., Seattle, $24,800 and $14,750 respectively. Bids Sept. 20.

West Virginia—State Rd. Comn., Charleston, improving road in Fayette Co., to Hatfield Constr. Co., Huntington, $135,118***road in Jackson Co., to W. L. Johnson Constr. Co., Hicksville, O., $144,060***road in Mercer Co., to Price Constr. Co., Huntington, $204,773. Grand total $491,951. **P.W.A.** Bids Sept. 18. Noted Sept. 13.

Alberta—Dpt. P. Wks., Edmonton, constructing 18 mi. west boundary of Edson to Pedley, Jasper Hy., to Western Constr. & Lumber Co., Edmonton***25 mi. Pedley to boundary of Jasper Park and 27 mi. Strathmore-Calgary Hy., to F. Mannix, 1236 8th Ave. W., Calgary*** 30 mi. Trans-Canada Hy. from west of Cochrane, Alta. to boundary of Banff Park, to Poole Constr. Co., Ltd., 733 Tegler Bldg., Edmonton.

Ontario—C. H. Fullerton, deputy minister Dpt. Northern Development, Parliament Bldgs., Toronton, surface treating 10 mi. Ferguson Hy., Contr. 47 P.S., Powassan-Callander section and 11 mi. Trans-Canada Hy., (Mile 7 to mile 18 west of Pembroke), Contr. 14 N.R., to James M. Davis Constr. Co., 124 Richmond St. W., Toronto***1.15 mi. Temiskaming, through town of Cobalt, Contr. 38, to McNamara Constr. Co., Ltd., Industrial St., Leaside, est. $35,000 for foregoing projects***surface treating 21.25 mi. Port Arthur-Nipigon Sect. of Trans-Canada Hy., Contr. 8, West Ontario, to Hewitson Constr. Co., Port Arthur, about $25,000.

B. C., Victoria—Dpt. P. Wks., general improvements and repairs to roads and bridges on Vancouver Island, by force account under Government Engineers and road foreman, under unemployment relief scheme, $110,000. Dpt. P. Wks., Victoria, engr.

EARTHWORK, IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

Tex., Brownsville — Brownsville Navigation Dist., c/o W. G. Willman, chn. Bld., since awarding Contr. "B" the remainder of entire project (ship channel) divided as follows and bids will soon be taken, Contr. A, wharves and transit sheds; Contr. E, furnishing, laying mains in district; Contr. D, automatic sprinklers; Contr. "EE" railroad extension; Contr. "F" hy. extension; Contr. "G" power line extension; Contr. "H" ore dock. $2,100,000. R. J. Cummins, Bankers Mortgage Bldg., Houston, and Brownsvills, engr. Noted Mar. 29.

BIDS ASKED

Calif., Los Angeles—Oct. 15, by Bd. Supervs. Flood Control Dist., 205 South Bway., constructing Unit 7, San Gabriel River Outlet. To exceed $17,750. Former bids rejected. S. M. Fisher, 205 South Bway., engr.

Calif., Modesto—Oct. 16, by C. S. Abbott, secy. Modesto Irrigation Dist., constructing rock cut, repairing old lining by guniting, constructing rein.-con. structures all in main canal of district. $17,750 or more.

Fla., Atlantic Beach—Oct. 12, by Town, constructing 5,651½ ft. rein.-con. seawall, complete with stairways and back fill and 2 ramps at easterly ends of 7th and 15th Sts. P.W.A. project. Bids Aug. 6 rejected. R. E. Suggs, mayor. Hills & Youngberg, P. O. Box 36, Jacksonville, engrs.

†Illinois—Oct. 10, by U. S. Eng., Post Office, Canal and Van Buren Sts., Chicago, widening channel in Dresden Island Pool of Illinois Waterway, at Treat's Island in Des Plaines River, incl. 182,500 cu.yd. material.

†Louisiana—Oct. 12, by U. S. Eng., 2nd Dist., New Orleans, 2,800,000 cu.yd. levee work in East Atchafalaya Basin.

La., New Orleans—Oct. 10, by State Bd. Engineers, constructing earth, timber dam across borrow pit on Buras-Fort Jackson back protection levee in Plaquemines Parish.

†Md., Annapolis—Yards & Docks, Navy Dpt., Wash., D. C., taking bids dredging at Naval Academy, Spec. 7809. (Date not set.)

†Massachusetts—Oct. 17, by U. S. Eng., Boston, dredging 1,424,000 cu.yd. in Cape Cod Canal; adv. E.N.-R. Oct. 4. To exceed $400,000. Noted July 12.

†Mo., Canton—Oct. 24, by U. S. Eng., Rock Island, Ill., constructing remedial works at Lock and Dam 20, in Mississippi River, incl. drainage ditch, new levee, repairing existing levee, roadway, relocating existing levee, roadway, relocating existing roadway south of O'Farrel Lake, bridge, culvert repairs, removing bridges, miscellaneous metal work, stone work, grading, etc., 487,500 cu.yd. common and 38,000 cu.yd. rock excav., 270 sq.ft. channeling rock, 395,000 cu.yd. fill and back fill, 1,220 cu.yd. stone rip rap, 785 cu.yd. gravel road surfacing, etc.; adv. E.N.-R. Oct. 4.

†South Carolina — U. S. Eng., Charleston, taking bids dredging 10,718,800 cu.yd. from Intracoastal Waterway between Little River and Winyah Bay. (Date not set.)

†Utah, Ephraim—Oct. 18, by Bureau Reclamation, Salt Lake City, constructing Ephraim Tunnel, Ephraim Project, incl. 1,800 cu.yd. open cut excav., 9,440 cu.yd. excav. in tunnel, near here. Spec. 587.

†Washington—U. S. Eng., Seattle, taking bids dredging 640,000 cu.yd. material from Duwamish Waterway, Seattle Harbor. (Date not set).

LOW BIDDERS

†Montana—U. S. Eng., Kansas City, Mo., Sept. 24, constructing spillway at Fort Peck Dam, consisting of unlined approach channel about 2,000 ft. long leading to an intake structure composed of structural steel gates mounted between concrete piers, concreted lined channel about 5,000 ft. long and a cut-off structure at lower end of this channel, an unlined outlet channel will also be excavated from lower end of lined channel to the river valley, from Hardwick & McGlone, City Bank Bldg., Kansas City, Mo., $7,918,530. Noted Sept. 6.

CONTRACTS AWARDED

†Arkansas—U. S. Eng., Vicksburg, Miss., 40,000 cu.yd. levee work on Arkansas River, to J. C. Leathers, Alexandria, La., $13,200. Bids Sept. 14.

†Calif., Colusa—U. S. Eng., Post Office Bldg., Sacramento, constructing Butte Slough culvert type outfall gates for passage of flood waters from Butte Basin to Sacramento River, 3.75 mi. downstream from here, to S. H. Palmer Co., 444 Market St., San Francisco, $85,517. Est. $79,535. Bids Aug. 31, awarded Sept. 21.

†Calif., Calexico—Dpt. Interior & Imperial Irrigation Dist., El Centro, 13 mi. All American Canal, section to extend from point north of here to intercept west side main Canal, force account. Route is being surveyed under direction of H. G. McDowell, Calexico. $1,000,000.

†Calif., Collinsville—U. S. Eng., Post Office Bldg., Sacramento, furnishing, delivering, placing 16,000 tons rip rap stone Class A or B along banks of Sacramento River between mouth of Cache Slough and Collinsville, Spec. 6588, to Basalt Rock Co., 900 8th St., Napa, $28,000. Bids Aug. 29, awarded Sept. 21.

†Florida—U. S. Eng., Jacksonville, 17 drainage spillway structures on banks of St. Lucie Canal, to E. H. Latham, Clewston, $420,443. Bids Sept. 14. Noted Aug. 30.

†Ga., Augusta—U. S. Eng., Savannah, constructing New Savannah Bluff Lock and Dam on Savannah River below here, to Arundel Corp., foot Pratt St., Baltimore, Md., $977,309. Bids Aug. 31. Noted Aug. 9.

Idaho, Shoshone—Big Wood Canal Co., reconstructing outlet works, installing emergency gates, needle valves, etc., for Magic Dam, to Morrison-Knudson Co., Boise, $102,490. **P.W.A.** Bids Sept. 14. Noted Aug. 30.

†Ill., Chicago—U. S. Eng., 8,500 tons rubble mound stone on breakwater in Chicago Harbor, to Great Lakes Dredge & Dock Co., 104 South Michigan Ave., $25,330. Bids Sept. 20. Noted Sept. 25.

†Louisiana—U. S. Eng., New Orleans, 980,000 cu.yd. levee work in East Atchafalaya Basin, to Jahncke Service, Inc., 814 Howard Ave., New Orleans, $369,950; 1,010,000 cu.yd. in East Atchafalaya Basin, to C. I. Jones, Baton Rouge, $236,845. Bids Sept. 17.

†Maryland—U. S. Eng., Baltimore, dredging 23,000-33,000 cu.yd., to Norfolk Dredging Co., Norfolk, Va. Noted Aug. 30.

†Mass., Boston—U. S. Eng., Custom House, repairing and extending concrete and stone rip rap seawall, at Great Brewster Island, Boston Harbor, to M. J. Crowley, 61 Pershing Rd., Jamaica Plain, $9,190. Bids Sept. 17, awarded Sept. 21. Noted Sept. 13.

†Mass., Boston—U. S. Eng., Custom House, repairing and extending concrete and stone rip rap seawall at George's Island in Boston Harbar, to M. J. Crowley, 61 Pershing Rd., Jamaica Plain, $4,025. Bids Sept. 21.

Mass., Narragansett—State, Dpt. P. Wks., Providence, harbor improvements at Pt. Judith, to Tucker Constr. Co., 346 Washington St., Providence, $220,000.

†O., Cleveland—U. S. Eng., Buffalo, N. Y., removing 150 ft. old breakwater, dredging 25,000 cu.yd. material, constructing rubble mound sea slope, 400 ft. spur breakwater, at Cleveland Harbor, to Great Lakes Dredge & Dock Co., Morgan Bldg., Buffalo, N. Y., $139,793. Bids Sept. 19. Noted Sept. 9.

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†Federal Government.

Earthwork, etc. (Continued)

†O., Zanesville—U. S. Eng. making foundation investigations at proposed Freeport Dam site in Muskingum Valley, to Sprague & Henwood, Inc., Scranton, Pa., $2,513•••at proposed Beach City and Clending, to Pennsylvania Drilling Co., 1201 Chartiers Ave., Pittsburgh, Pa., $5,731•••at proposed Mohawk and Dower Dam site, to H. C. Nutting Co., West 71st St., Cincinnati, $6,608. Grand total $14,852. Bids Sept. 22.

Tex., Harlingen—Cameron Co. Water Impvt. Dist. 19, K. McCanse, pres., earthwork only. Units B and C, near Arroyo, Colo., in connection with construction of 30 mi. concrete canals and 30 mi. pipe ines, pump plant with 3 motor driven, 30 in. pumps, to A. George, Harlingen; constructing 30 mi. concrete pipe lines in connection with above, to Southwestern Concrete Pipe Co., San Benito, $54,000. Total est. $471,000. **P.W.A.** Noted June 21.

B. C., Creston—Southern Dyking Comn., constructing 14 mi. solid clay dyke to reclaim 8,000 acres of land, to Creston Dyking Co., Creston, $250,000. W. B. Heath, Creston, engr.

N. S., Brooklyn—Dpt. P. Wks., Ottawa, Ont., breakwater extension, to M. A. Condon & Son, Kentville, $58,696. Est. $75,000.

Que., Chicoutimi—Dpt. Marine, Ottawa, Ont., harbour works and improvements, to J. Angers, 299 Racine St., $142,000.

Que., Montreal — Montreal Harbour Comn., constructing certain protection works against sifting of filling materials supporting Grain Elevator 3, between Laurier and Tarte Piers, Montreal Harbour, steel sheet piling, steel pipe piles, rein.-con. superstructure, to Angus Robertson Ltd., 660 St. Catherine St. W., $254,540. Est. $378,000.

UNCLASSIFIED

PROPOSED WORK

Mo., St. Louis—MEMORIAL PARK—City tentative sketches made by LaBeaume & Klein, 315 North 7th St., for presentation to a Congressional Committee that is considering the construction memorial to Thomas Jefferson and explorers and pioneers of Mississippi Valley, on ground between Eads and St. Louis Municipal bridges, on Mississippi River and east of 3rd St., incl. tall central building flanked by 2 long buildings, a mall, leading to old court house building at 4th and Market Sts., landscape terrace along river front, and several memorial shafts. $25,000,000-$35,000,000 incl. acquisition of land. Noted Jan. 11.

Pa., Pittsburgh—TUNNEL, etc.—See "Bridges and Grade Crossings."

BIDS ASKED

Calif., Woodlawn—MAUSOLEUM, etc.—W. G. Merchant, assoc. archts., Maybeck & White, Russ Bldg., San Francisco, taking bids rein.-con., marble, bronze interior mausoleum and concrete, granite chapel, Woodlawn Cemetery, for Woodlawn Cemetery Assn. $115,000 or more.

†Mich., St. Joseph—BOATHOUSE, etc.—Oct. 12, by U. S. Coast Guard, 1 story, frame boat house and launchways.

CONTRACTS AWARDED

†Calif., Eureka — LIGHTS on TOWERS — Yards & Docks, Navy Dpt., Wash., D. C., lights on towers, to H. F. Haverkamp, 1127 Folsom St., San Francisco, $678. Bids Sept. 19.

Calif., San Francisco — SCALE and SPUR TRACK—Bauer Schweitser Hop & Malt Co., 600 Sacramento St., constructing scale and concrete pit and installing 50 ft. railroad track scale, to General Pacific Scale Co., 1106 Brayant St.; constructing spur track, to Fay Impvt. Co., Phelan Bldg. Total $40,000. Noted Sept. 13.

Mo., St. Louis—STREET LIGHTING FACILITIES—Bd. P. Service, City Hall, furnishing standards, naphtha and maintaining and cleaning glassware for lighting various streets with naphtha for 3 year period beginning Oct. 1, to Welsbach Street Lighting Co. of America, 317 North 11th St., $428,587. Bids Sept. 11. Rejected bids Sept. 11, maintaining gas transmission equipment for same period. Noted Aug. 30.

N. Y., Brooklyn — STATION FINISH — Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, station finish work for Court, Hoyt-Schermerhorn, Fulton St., Lafayette Ave. and Clinton-Washington Ave. Stations, to Meads Eng. Co., Inc., 217 West 14th St., New York, $358,000. Bids Aug. 23. Noted Aug. 16.

N. Y., Jamestown—ATHLETIC FIELD—Dpt. P. Wks., City Hall, constructing modern athletic field, rear Washington Junior High School, by TERA labor, under supervision L. F. Graham, city engr. Noted Sept. 6.

†N. Y., New York—DOCK REPAIRS—Treas. Dpt. at office Sup. Archt., Wash., D. C., dock repairs at Barge Office, to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., New York, $18,876. Bids Sept. 4.

Wis., Madison—CHIMES and CARILLON TOWER—University of Wisconsin chimes and carillon tower, to Maas Bros. Co., Watertown. $28,220. Est. $28,000. **P.W.A.** Bids Sept. 18, awarded Sept. 22. Noted Sept. 13.

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MATERIALS AND EQUIPMENT

PROPOSED WORK

CAST IRON PIPE, etc.—**Oil City, Pa.**—City, B. B. Webber, engr., City Hall, bids early in October, furnishing 850 ft. 16 in. 800 ft. 12 in., 420 ft. 8 in., 175 ft. 6 in. c.i. pipe and fittings, $5,413; valves, $1,000; lead, $500; manholes for use in connection with extension of municipal water supply system.

BIDS ASKED

STORAGE BATTERY LOCOMOTIVES, etc.—**Los Angeles, Calif.**—Oct. 17, by D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering 12 storage battery type locomotives complete with battery boxes and batteries and 14 adidtional battery boxes and batteries, 6 battery charging sets, Spec. 1521, (a) f.o.b. cars bidders shipping point (b) f.o.b. cars or trucks Los Angeles (c) f.o.b. cars Lone Pine. To exceed $2,000.

GATE VALVES—**San Francisco, Calif.**—Oct. 15, by T. A. Brooks, city purch. agt., City Hall, 20 in., 24 in. and 30 in. gate valves, Bid 1269. To exceed $1,000. P.W.A. project.

PORTLAND CEMENT MIXER—**North Chicago, Ill.**—City in market for portable cement mixer. R. Fennell, city engr.

STORAGE TANK for BITUMINOUS MATERIALS, etc.—**Indiana**—Oct. 10, by J. D. Adams, chn. State Hy. Dpt., Indianapolis, storage tank for bituminous materials delivered State Hy. Garage at Petersburg; 800-1,000 tons crushed aggregate or gravel furnished at plant in Seymour Sub-District; 1,500 tons crushed aggregate gravel or slag f.o.b. Richmond; 100-200 tons concrete sand, f.o.b. Fowler and Montmorence; 2,600 red cedar poles, f.o.b. Plymouth, Valparaiso, Covington, Vincennes and Columbus.

PUMPING EQUIPMENT—**Hope, Ind.**—Oct. 10, by Town, pumping equipment. Former bids rejected. P.W.A. project. S. Lambert, Hope, clk.

†STONE, etc.—**St. Louis, Mo.**—Oct. 9, by U. S. Eng., 6,000 cu.yd. stone and 1,000 cu.yd. crushed stone.

†CEMENT—**Montana**—Oct. 16, by U. S. Eng., Kansas City, Mo., 635,000 bbl. cement for Fort Peck Dam.

†TRANSFORMERS, etc.—**Nevada**—Oct. 15, by Bureau Reclamation, Denver, Colo., 30 transformers; 3 deep well turbine type, motor-driven pumping units, delivered f.o.b. cars at factory shipping point or at Boulder City Nev., for Boulder Dam and Power Plant, Boulder Canyon Project, Arizona-California-Nevada.

TURNSTILE EQUIPMENT—**New York**—Oct. 16, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, furnishing, installing turnstile equipment, incl. railings, gates and appurtenances for Stations Line A, extending from Court St. station to Rockaway Ave. station, Brooklyn; and Line B from Bway.-Lafayette St. station Manhattan to York Street Station, Brooklyn, forming portion of Independent City-owned Rapid Transit System.

CEMENT, etc.—**South Carolina**—Oct. 15, by State Hy. Dpt., Columbia, 170 to 190 bbl. portland cement, in paper sacks, 10,784 lb. reinforcing steel for concrete culverts, cut and formed where necessary as per blue prints, both delivered at Myrtle Beach, in connection with construction of U. S. P. Wks. Project NRS 342-A, Horry Co.

†OIL BARGE—**Norfolk, Va.**—Oct. 19, by U. S. Eng., constructing and delivering afloat 100x30x7 ft. steel oil barge; adv. E.N.-R. Oct. 4.

ELECTRICAL EQUIPMENT—**Seattle, Wash.**—Oct. 11, by Bd. P. Wks., G. W. Roberge, secy., electrical equipment and apparatus for Diablo Power House, Skagit Project, 196-230 KV. oil circuit breakers, 196-kv. disconnecting switches, auxiliary metal-clad switchgear, wall bushings, station light, power and heat switchboard, distribution panels, cabinets, neutral circuit breakers, rectifier equipment for switch operation, storage battery, battery charging M.G. sets, inverter, oil purifying and testing apparatus, hydraulic metering equipment, telephone equipment and main unit instrument transformers. To exceed $200,000.

†INSULATING BLANKETS, etc. — **Huntington, W. Va.**—Oct. 11, by U. S. Eng., insulating blankets, insulating cement and sheet iron for U. S. Locks, Ohio, Kanawha and Big Sandy Rivers.

†WICKET and TRESTLE CHAINS—**Huntington, W. Va.**—Oct. 11, by U. S. Eng., wicket and trestle chains for U. S. Lock 7, 9 and 10, Kanawha River.

PIPE, etc.—**Neenah, Wis.**—Oct. 9, by H. S. Zemlock, city clk., 3,906 lin.ft. 6- to 15-in. vitr. clay pipe; twenty-five 6 in. elbows; 35 bbl. cement; 150 sacks limote; 23 heavy manhole covers; 24 catch basin covers; 33,000 brick.

CONTRACTS AWARDED

BRIDGE STEEL—**Rob Roy, Ark.**—St. Louis Southwestern Ry., Cotton Belt Bldg., St. Louis, Mo., 850 tons structural steel for railroad bridge, to Virginia Bridge & Iron Co., Roanoke, Va.

CONDUIT—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering 100,000 ft. 4 in. I.D. socket joint, straight fibre conduit ¼ in. wall thickness, Spec. 1510, to Westinghouse Electric Supply Co., 905 East 2nd St., at $12.50 per 100 ft. Bids Sept. 20, awarded Sept. 25.

TRANSFORMERS, etc.—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering four 1667 kva. transformers, 104,000 V to 19,920 V single-phase, oil immersed, self-cooled, stepdown outdoor type, 60 cycle transformers, Spec. 1481, to Molony Electric Co., I. W. Hellman Bldg., $41,745. Bids Aug. 27, awarded Sept. 25. Noted Aug. 16.

TRANSMISSION LINE HARDWARE, etc.—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering transmission line hardware, Item 1, to General Electric Supply Co., 385 East 2nd St., $93,000. Noted Sept. 13.

WIRE and CABLE—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 297 South Bway., wire and cable for transmission and telephone line, Mono Basin Project, Spec. 1492, to General Cable Corp., 63,875 lb. 1/0 AWG 7-strand, Medium hard drawn, bare copper cable, f.o.b. cars or trucks, Los Angeles at $14.37; 39,100 lb. No. 8 AWG solid hard drawn bare copper wire, f.o.b. cars or trucks, Los Angeles, $13.34; 80,100 lb. No. 8 AWG solid copper covered steel wire, f.o.b. cars Lone Pine, $16 61. Bids Sept. 6, awarded Sept. 25.

PUMPING ENGINE — **Madera, Calif** — City Council, 750 gal. pumping engine and hose car with water tank equipment, to Mack International Motor Truck Co., 11th and Howard Sts., San Francisco, $8,750. Bids Sept. 4, awarded Sept. 20.

STEEL STORAGE TANKS—**Oakland, Calif.**—Rio Grande Oil Co., 417 South Hill St., Los Angeles, steel storage tanks, 47th Ave., to Harman-Pacific Co., 7 Front St., San Francisco, approximately $5,500. Awarded Sept. 24.

STEAM SHOVEL—**Redwood City, Calif.**—E. L. Werder, purch. agt. San Mateo Co., ¾ cu.yd. or ½ cu.yd. power shovel, full revolving and crawler mounted, to Northwest Eng. Co., 255 10th St., San Francisco, $6,915. Awarded Sept. 22.

GATE VALVES—**San Francisco, Calif.**—T. A. Brooks, city purch. agt., 8, 12 and 14 in. valves, head gearing for 16 and 18 in. gate valve and 12 in. check valve, Bid. 1243, to A. P. Smith Mfg. Co., East Orange, N. J., and 1142 Howard St., San Francisco. Bids Aug. 10. Noted Aug. 2.

STEEL ROLLING DOORS — **San Francisco, Calif.**—State Bd. Harbor Comn., Ferry Bldg., furnishing, installing steel rolling doors in bulkhead buildings at Piers 38 and 40, to J. G. Wilson Corp., 24 California St., $5,233. Bids Sept. 6, awarded Sept. 21.

STEEL TANKS—**New London, Conn.**—Valvoline Oil Co., 101 East 16th St., 2 steel tanks for oil storage. Owner builds. $6,500. Private plans.

FLOOD PUMPS — **Stamford, Conn.** — City, Purchases & Supplies, furnishing, installing two flood pumps, to Quinby Ryan Sales Corp., 1 East 42nd St., New York, $4,093.

SPRUCE PILES, MANHOLE STEPS, etc.—**Quincy, Mass.**—City, P. Wks. Dpt., spruce piles, P.W.A. 2051, to A. A. Hersey & Son, 197 Marginal St., Chelsea, $2,110•••manhole steps and rods, to Pinel Tool Co., 242 Water St., Quincy, $591 and $349 respectively•••crushed stone, to Old Colony Crushed Stone Co., Vermon St., $2,820•••penetration asphalt, to Bituminous Pav. Products Co., Quincy, $4,960. Grand total $10,830. Bids Sept. 4.

†DIPPER LIP—**Duluth, Minn.**—U. S. Eng., Canal Park, 1 manganese steel dipper lip for Dredge Col. D. D. Gaillard, to Abel Davis, Receiver, Pettibone Mulliken Co., 4710 West Division St., Chicago, Ill., at 14.65c. per lb. Noted Sept. 18.

†TIES—**Montana**—U. S. Eng., Kansas City, Mo., 10,150 ties for land booster car tracks, Fort Peck Dam, to H. Good, Kalispell, $5,556. Bids Aug. 30.

†TURNOUT, etc.—**Montana**—U. S. Eng., Postal Telegraph Bldg., Kansas City, Mo., turnout for Fort Peck Construction Railroad, to Romane Ajax Corp., 230 Park Ave., New York, N. Y., $5,751 net•••14,000 cu.yd. ballast for spillway track, to J. L. Shiely Co., Builders Exch. Bldg., St. Paul, Minn., $9,800 plus freight weight•••rails and accessories, to A. Roeder, trustees for Colorado Fuel & Iron Co., Continental Oil Bldg., Denver, Colo., $14,124 plus freight rate. Grand total $29,675.

†STERILIZER EQUIPMENT—**Phila, Pa.**—Yards & Docks, Navy Dpt., Wash., D. C., sterilizer equipment at Navy Yard, Spec. 7744, to American Sterilizer Co., Erie, Pa., $21,184. Bids Sept. 19. Noted Aug. 30.

PUMP—**Reynoldsville, Pa.**—Borough, steam driven pump for use at water plant, to National Transit Pump & Machine Co., Oil City, $2,800. Noted Sept. 6.

OIL—**Virginia**—Dpt. Hys., Richmond, oil, to Atlantic Refining Co., 1302 Brookland Park Blvd., Richmond, $14.481•••to Harwood Bros., Inc., 1009 East Canal St., Richmond, $6.083•••and to Standard Oil Co. of New Jersey, Richmond, $9,325. Grand total $29,889. Bids Sept. 18.

†STEEL PIPE, etc.—**Milwaukee, Wis.**—U. S. Forest Service, to Ellsworth Pipe & Supply Co., 4878 North 35th St., 530 ft. 6 in. galvanized

†*Federal Government.*

Materials, etc. (Continued)
pipe, $470; 455 ft. 4 in., $219; 1,305 ft. 3 in. $536; 264 ft. 2 in., $46***to Central Supply Co., 312 South 3rd St., Minneapolis, Minn., 42 ft. 7¼ ft. lengths galvanized steel pipe, $167 ***to L. R. Flori, 2626 North Bway., St. Louis, Mo., 42 quick action couplings at $63; 4,650 irrigation nozzles, $70***to Whiteshowers, Inc., Detroit, Mich., 1,175 pipe hangars, $145***to Ellsworth Pipe & Supply Co., 13,000 ft. 1- to 24-in. galvanized steel pipe, $1,581***to Duluth Culvert Co., 49 Avenue W and Superior St., Duluth, Minn., $132. Grand total $3,429. Awarded Sept. 19.

FOREIGN

Australia—Oct. 29, by State Electrical Comn., **Melbourne,** supplying 12 automatic induction voltage regulators of various ratings***Oct. 30, by Deputy Minister, Posts & Telegraph Dpt., **Melbourne,** supplying 6 nautical miles of submarine cable***Dec. 3, by New South Wales Dpt. P. Wks., **Sydney,** hydro-electric plant, incl. 2 generator sets of 5,000 kw. switchgear, piping for Burringuck.

—Australia, Melbourne—Nov. 29, by Melbourne & Metropolitan Tramway Bd., 1,000 volt paper insulated lead covered cables.

Scotland—Aberdeen Bd. Educ. making plans new school, $1,250,000***Kilsyth Town Council making plans erecting 300 houses in **Bargill,** $420,000***National Bank of Scotland making plans new office building on St. Andrew Square, **Edinburgh,** $1,000,000.

South Africa, Durban—T. H. Watermyer of South African Railways & Harbor Administration, bids in October constructing pre-cooling storage plant, $1,000,000.

DETAILS OF PWA NON-FEDERAL ALLOTMENTS

Loans and Grants Except as Noted. *Grant. †Loan.

KEY TO SYMBOLS

m-meters	**c**-canal
p-pump	**dm**-dam
t-tank or standpipe	**r**-reservoir
f-filtration	**t**-treatment plant
d-distr. supt.	**b**-building
w-well	**i**-iron removal
s-supply	**pw**-power line
g-generator	**sf**-softening
ch-chlorinators	**bl**-boilers

Water Works

Bradner, Ohio **d-sf-p**	$48,000
Handley, Tex. **w-p-r-t-d-m**	150,000

Sewers

Greenburg, N. Y.	226,000

Sewers & Disposal Plants

Pilot Point, Tex.	49,000

Bridges

*Hampton, Conn. (also road)	16,000
New York, N. Y. (bascule)	408,700

Street or Road Const.

*Wilson County, Tex.	48,000

Buildings

*Austin, Tex. (market building)	11,800
Chatham, Ill. (community building)	30,800
Galen, Mont. (hospital)	215,200
New York, N. Y. (health centers)	1,198,300
New York, N. Y. (hospital)	306,000

Schools

*Montrose, Colo.	22,000
Nacogdoches, Tex. (dormitory Stephen F. Austin State Teachers College)	123,000
St. John's, Ariz.	33,400
Savanna, Okla.	6,700

PUBLIC BUILDINGS

PROPOSED WORK

Calif., Berkeley—Berkeley City Elementary School Dist., election Nov. 6, $2,216,500, for 3 new elementary schools and rehabilitation of Garfield and Edison Junior High Schools.

†Federal Government.

Calif., Pittsburg — Pittsburg School Dist., election Oct. 16, $40,000 for primary school; $38,000 for Junior High School; $18,000 for Intermediate School. Amount of $10,000 will be added to above to be obtained from sale of school property and $4,000 already available in school funds. L. Stone, Humboldt Bank Bldg., San Francisco, archt. Noted May 24.

N. J., Springfield—City has filed application with P.W.A. for loan and grant for construction of regional high school. Est. $500,000. F. A. Elsasser, 100 Stuyvesant Ave., Union, and L. M. Dennis, 333 North Broad St., Elizabeth, assoc. archts. (**Correction**—Status of project and architects.) Noted Sept. 13.

BIDS ASKED

Calif., Compton—Oct. 19, by P. Wks. Reconstruction, at 601 South Acacia St., 2 story, 190x225 ft. administration building and 40x95 ft. stage, $300,000-$350,000. Austin & Ashley, 608 Chamber of Commerce Bldg., Los Angeles, archts. Noted Sept. 6.

Conn., Hartford—Oct. 9, by State, A. B. Keeler, comptroller, hot and cold water piping, State Police Administration Building. P. D. Bemis, 36 Pearl St., engr.

Ind., Goshen—Oct. 10, by City, H. H. Gartner, chn., new heating plant for Goshen Hospital and Nurses Home. $17,000.

†Ky., Louisville—Oct. 10, by Treas. Dpt. at office Sup. Archt., Wash., D. C., plumbing enclosures in U. S. Marine Hospital; adv. E.N.-R. Oct. 4. $1,200-$1,500.

Mass., Dorchester—Oct. 9, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, electric wiring in connection with central power plant construction at Boston State Hospital. P.W.A. Project M-2 (part). To exceed $25,000. R. D. Kimball Co., 6 Beacon St., Boston, engrs.

Mo., Greenfield—Oct. 11, by A. Wilson, clk. Dade Co., 2½ story, 70x70 ft., rein.-con., brick, stone court house. Public Sq. P.W.A. project. Bonsack & Pearce, Inc., 411 Olive St., St. Louis, archts. Noted July 19.

New York—Oct. 11, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brookyn, altering and constructing additions to electrical work in P. S. 56, 170 and New York Parental School; altering, repairing P. S. 3, 5, 16, 36, 44, 46, 50, 63, 66, 75, 99, 136, 170, Bryant High and Jamaica High Schools and Jamaica Vocational High School Annex, all foregoing Queens Co.***altering and sanitary work East Side Continuation School, 43 Oak St.; altering P. S. 174, Attorney St., all foregoing Manhattan Boro***altering P. S. 39, Longwood Ave. and Kelly St.; P. S. 78, Fish and Needham Aves., both Bronx Boro ***P. S. 192, 4715 18th Ave. and P. S. 54 and Thomas Jefferson High School, both Brooklyn Boro, for Bd. Educ., 500 Park Ave., New York.

†Okla., Clinton—Oct. 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, $68,800.

Tex., Matagorda—Oct. 12, by L. Robertson, secy. Bd. School Trustees, high school, incl. furnishing, installing equipment, etc. H. D. Payne, 4301 Main St., Richmond Ave., Houston, archt. and engr. P.W.A. project.

Wash., Pullman—Oct. 12, by Washington State College, general contract, plumbing, heating, ventilating, electrical wiring for science building on campus. $270,000. S. A. Smith, Pullman, archt.

†W. Va., Parkersburg—Oct. 25, by Treas. Dpt. at office Sup. Archt., Wash., D. C., remodeling U. S. Post Office. Bids Sept. 7 rejected. Noted Aug. 30.

CONTRACTS AWARDED

Ala., Mobile—City, constructing courthouse, to Foster & Creighton Co., American Natl. Bank Bldg., Nashville, Tenn., $363,100. Awarded Sept. 15.

Calif., Los Angeles—Bd. Educ., reconstructing, rehabilitating, strengthening main building at Center Ave. School, west side of Walnut Ave., near Inglewood, to Monolith Constr. Co., 169 North La Brea Ave., $555,555. **P.W.A.** Awarded Sept. 17. A. S. Niebecker, Jr., Chamber of Commerce Bldg., archt. L. J. Waller, 4350 Beverly Blvd., engr.

†Calif., Oakland—Treas. Dpt. at office Sup. Archt., Wash., D. C., additions and changes to Post Office, to F. J. Early, Jr., 369 Pine St., San Francisco, $5,150. Bids Sept. 13.

Conn., Lisbon (P. O. Jewett City)—State Hy. Dpt., State Office Building, Hartford, furnishing, installing wiring, switches, panels, etc., at garage and repair shop for State Hy. Dpt., to Miller Electric Co., 102 Linwood St., New Britain, $1,153. Bids Sept. 12.

†D. C., Wash.—Treas. Dpt. at office Sup. Archt., furnishing, installing elevator plant in Internal Revenue extension, to Otis Elevator Co., 810 18th St., $87,725.

†Fla., Plant City—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to N. S. Ikerd, Bedford, Ind., $40,644. Bids Aug. 28. Noted Aug. 9.

†Ill., Chicago—Treas. Dpt. at office Sup. Archt., Wash., D. C., new concrete balustrade and retaining wall at appraiser's stores building, to J. Kinnare, 2816 West Monroe St., $10,961. Bids Sept. 17. Noted Sept. 6.

†Ill., Chicago—Treas. Dpt. at office Sup. Archt., Wash., D. C., furnace repairs in court house, to Chicago Down Draft Furnace Co., 115 Clinton St., Chicago, $9,600.

†Ill., East Alton—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to J. McHugh Sons, 6449 South Park Ave., Chicago, $40,200. Bids Aug. 23. Noted Aug. 9.

Ind., Indianapolis—Bd. Trustees Central State Hospital for Insane, 3000 West Washington St., new domestic hot water system for hospital, to Freyn Bros., 1028 North Illinois St. Noted July 19.

Ind., Decatur—Adams Co., heating plant at court house, to Hyland Plumbing Co., Decatur. G. Cowen, aud. Bids Sept. 4. Noted Aug. 30.

†Ind., Lawrenceburg—Treas. Dpt. at office Sup. Archt., Wash., D. C., brick, steel U. S. Post Office, to C. Westborg Co., Inc., 6234 South Oakley Ave., Chicago, Ill., $40,400. Bids July 18. Noted July 5.

Ky., Louisville—University of Louisville, constructing medical school buildings, 1st and Chestnut Sts., to J. F. Russell & Co., 3908 Frankfort Ave.***plumbing, to Meyer Plumbing & Heating Co., 635 South Preston St.*** heating, to Parker Miller, 4501 Meridale Ave. ***wiring, to Marine Electric Co., 104 East Market St.***elevators, to Otis Elevator Co., 653 South 2nd St. Est. $230,000. **P.W.A.** Noted Mar. 1.

Md., Catonsville—State, Bd. Welfare, Union Trust Bldg., Baltimore, 2 story, basement new auditorium at Spring Grove State Hospital, to Cogswell Constr. Co., 406 Park Ave., Baltimore, $106,400. Est. $100,000. Bids Sept. 14. Noted Sept. 20.

Mass., Chelsea—Commonwealth of Massachusetts, W. J. Keville, pres., Service Bldg., Soldiers Home, 3 and 4 story, and basement, 240x30x58 ft. dormitory at Soldiers Home, to John Bowen Co., Inc., 129 Newbury St., Boston, $186,250; plumbing, to Downey Co., 791 Tremont St., Boston, $17,948. **P.W.A.** Bids Sept. 11, awarded Sept. 24. Noted Aug. 30.

Mass., East Boston (sta. Boston)—City of Boston, Dpt. School Buildings, 11 Beacon St., Boston, 3 story, basement, 68x79 ft., brick, steel, granite limestone high school addition, incl. heating and plumbing, electrical work. White, Putnam and Brooks Sts., to D'Amore Constr. Co., 89 State St., Boston, $128,600. Bids Sept. 19, awarded Sept. 25.

Mass., Milton—R. H. Doane, archt., 60 Batterymarch St., Boston, plumbing for Junior High School, 3 story, basement, 65x210 ft. and 1 story, 65x70 ft., brick, steel, stone, Edge Hill Rd., to E. C. Kelly, 195 Center St., Jamaica Plain***heating, to Jas. S. Cassedy, Inc., 133 Austin St., Cambridge***electrical work, to Barnes Pope Co., 98 Brookline Ave., Boston. Noted Sept. 20, under "Contracts Awarded."

Mass., Waltham — City, Purchasing Agent, City Hall, installing sprinkler system in City Infirmary, to Rockwood Sprinkler Co., 120 Milk St., Boston, $3,127. Bids Sept. 20, awarded Sept. 25. Noted Sept. 13.

Mich., Manistee—L. Bergman, secy. Bd. Educ., brick, steel, concrete fireproof school, North Side school site, to Anderson Constr. Co., Manistee, $58,700***heating, to J. Dykema, Grand Rapids, $3,547***plumbing, to Lloyd & Smith, Manistee, $3,278. Grand total $65,525. **P.W.A.** Bids Sept. 18. Noted Sept. 13.

†Minn., Litchfield—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to J. Kratochvil, New Prague, $34,250. Bids Sept. 19. Noted Sept. 6.

Mo., St. Louis—Bd. Educ., 911 Locust St., general contract altering and constructing east and west wings each 3 story, 34x56 ft. additions to Columbia School, to J. Hill Constr. Co., Syndicate Trust Bldg., $66,941 est. $85,000 ***3 story, 34x91 ft. additions and alterations to Gundlach School, to W. McDonald Constr. Co., 3829 West Pine Blvd., $41,217 est. $60,000 ***altering and constructing 1 story, top addition, for playroom, at Carondelet School, 8221 Minnesota Ave., to Kloster & Co., 5215 South Grand Blvd., $12,607 est. $12,500. Grand total $120,765. **P.W.A.** Bids Sept. 5. Noted Aug. 23.

†Montana—U. S. Eng., Kansas City, Mo., constructing camp buildings, 43 garages at Fort Peck, to Wm. MacDonald Constr. Co., 3800 West Pine Blvd., St. Louis, Mo., $33,073. Bids Sept. 21. Noted Sept. 13.

†N. J., Haddonfield—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Ivacchini Bros., 215 Fairview Ave., Highland Park, Pa., $34,230. Bids Sept. 18. Noted Sept. 6.

N. Y., Bayside—Bd. Educ., 500 Park Ave., New York, plumbing for Bayside High School, to J. E. Kahn, 224 West 20th St., New York, $116,940***heating, to Daniel J. Rice, Inc., 4105 38th St., Long Island City, $227,340*** electrical work, to Hanson Bros., 1 Hanson Pl., Brooklyn, $83,747***fixtures, to Ferro Art Co., Inc., 406 West 31st St., New York, $11,898. Grand total $439,925. Bids Sept. 11. Noted Aug. 30.

N. Y., Bedford—Dpt. Correction, State Office Bldg., Albany, general contract administration building, tunnels at Westfield State Farm, to

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Public Buildings (Continued)

M., Kantrowitz Constr. Co., 103 Park Ave., New York, $84,000***heating, to Afgo Eng. Co., 142 Fulton St., New York, $11,783*** electrical work, to Goodrich Electric Installation Co., 166 Lexington Ave., New York, $7,483***sanitary work, to J. Winkel Co., Larchmont, $3,376. Grand total $106,642. Bids Sept. 6. Noted Aug. 23.

N. Y., Cold Spring—C. P. Boland Co., general contractors, 101 Park Ave., New York, 140 tons structural steel for school, to Bethlehem Fabricators, Inc., Bethlehem, Pa., for Bd. Educ. Putnam Valley School Dist. 1. Noted Aug. 23, under "Contracts Awarded."

N. Y., Endicott—School Bd., general contract G. A. Nichols Elementary School, to J. M. Knowlton, 201 Robinson St., Binghamton, $174,600. **P.W.A.** Bids Sept. 18, awarded Sept. 20. Noted Sept. 13.

N. Y., Lake Placid—Village, heating and ventilating in school, to American Warming & ventilating Co., 317 Pennsylvania Ave., Elmira, $44,443***roofing and sheet metal, to J. J. Fisher Co., Inc., 187 15th St., Brooklyn, $9,950 ***plumbing, to A. J. Eckert Co., Inc., 103 North Lake Ave., Albany, $19,950***electrical work, to W. W. and J. M. Gety's, 106 Lake St., Rouses Point, $14,520. Grand total $88,863. **P.W.A.** Noted Sept. 6, under "Contracts Awarded."

N. Y., New York—W. G. Morgan, comr. Markets, Municipal Bldg., plumbing for 48 merchant stores, at Bronx Municipal Market, to Joseph F. Egan Co., 3013 Grand Concourse, $54,910. Bids Sept. 12. Noted Sept. 6.

†N. Y., New York—Treas. Dpt. at office Sup. Archt., Wash., D. C., miscellaneous betterments, to Allied Pneumatic Service Co., 47 5th Ave., $9,742. Bids Sept. 18. Noted Sept. 13.

N. Y., Westbury—Bd. Educ., school, to W. Kennedy Constr. Co., 215 Montague St., Brooklyn, $177,879. **P.W.A.** Bids July 30. Noted July 26.

†O., Port Clinton—Treas. Dpt. at office Sup. Archt., Wash., D. C., general contract U. S. Post Office, to Steine-Wolfe Constr. Co., Fremont, $35,935. Bids Sept. 21. Noted Sept. 13.

O., Columbus—City, W. J. Lucks, dir. Pub. Serv., marble work in connection with city hall addition construction, to Ardit Mosaic Tile & Marble Co., 667 West Mound St., $21,120*** terrazzo, to American Terrazzo Co., 614 North High St., $2,939***heating and ventilating, to Huffman & Wolfe Co., 669 North High St., $22,470***electrical work, to P. L. Gilmore, 395 East Broad St., $18,242. Grand total $64,771. **P.W.A.** Bids Aug. 24. Noted Aug. 16.

Pa., Reading—School Dist., 8th and Washington Sts., for N. W. Junior High School, 2 story, basement and sub-basement, 360x460 ft., brick, rein.-con., steel, plain found., to McCloskey & Co., 1620 Thompson St., Phila., $788,000***plumbing, to J. Borden & Bros., 637 North 19th St., Phila.***heating and ventilating, to Corbitt Bros., 147 North 5th St., Reading***electrical work, to Mitchell & Co., 1337 McFerren St., Phila. **P.W.A.** Bids Sept. 11, awarded Sept. 22. Noted July 12.

†S. C., Columbia—Building Com., Federal Land Bank, installing elevators in office building, to Otis Elevator Co., 39 Harris St. N.E., Atlanta, Ga., $34,041. Awarded Sept. 8. Noted Sept. 6, under "Contracts Awarded."

†Tennessee—Shiloh National Military Park, R. A. Livingston, supt., 2 story, 40x80 ft., brick, concrete administration building, 4 brick residences and 2 entrance stations, at Shiloh National Military Park, Pittsburgh Landing, to W. MacDonald Constr. Co., 3829 West Pine Blvd., St. Louis, Mo., $61,461 base bid. Bids Aug. 31.

†Va., Quantico—Yards & Docks, Navy Dpt., Wash., D. C., furnishing heating boilers and stack at Marine Barracks, to Granger Mchy. Corp., 15 Park Row, New York, N. Y. $5,464. Bids Sept. 19. Noted Sept. 13.

Wash., Seattle—Bd. P. Wks., County-City Bldg., constructing Diablo Power House, Proposition D, incl. power house building, combination transformer and switch platform, railroad bridge and tailrace, furnishing, placing concrete in generator pedestals, walls, beams, slabs and around machinery in power house building, to Hendrickson-Alstrom Constr. Co., Textile Tower, $267,298. Bids Sept. 13. Noted Sept. 6.

†Wisconsin—U. S. Forest Div., buildings at Camp Cable, Cable, to Schranfnagel Bros., Butternut, $20,149; at Camp Coon Valley, Coon Valley, to R. J. Eckenrode Co., Kenosha, $17,965***and at Camp Delta, Delta, to Nestor Wainio, Bessemer, $20,500. Grand total $58,614.

COMMERCIAL BUILDINGS

PROPOSED WORK

N. Y., Albany—Our Lady of Christians Roman Catholic Church soon lets contract steel, brick or stone school, plain found., 2nd St. $105,000. Gander, Gander & Gander, 17 Steuben St., archts.

BIDS ASKED

Mich., Kalamazoo—Albert Kahn, Inc., archts., 1000 Marquette Bldg., Detroit, bids about Oct. 2. 3 story, basement, 54x208 ft., brick, rein.-con., steel office building, plain found., for Upjohn Co., Kalamazoo. Noted Aug. 16.

N. J., Westfield—See "Contracts Awarded."

N. Y., Binghamton—Oct. 10, by Our Lady of Lourdes Memorial Hospital, steel church, plain found., $190,000. A. T. Lacey & Son, 52 Exchange St., archts. Noted Sept. 6.

CONTRACTS AWARDED

Calif., Los Angeles—California Fruit Grower's Exchange, 6th and Hill Sts., 6 story, 85x165 ft., rein.-con. Class A office building, with pan or tile inserts, concrete exterior, 1 freight elevator, and 2 passenger elevators, steel windows, steam heating, etc., garage on lower floor, to Wm. Simpson Constr. Co., Architects Bldg. Est. $1,000,000. Walker & Eisen, 708 Pacific Commerce Bldg., archts. Awarded Sept. 13. Noted Aug. 2.

Conn., Hartford—Allyn Wadhams Co., contractors, 15 Lewis St., steel for 2 story, 50x75 ft. office building on Pearl St. and office building on Trumbull St., to Scherer Steel, Inc., $106, Ardmore Rd., West Hartford***iron, to Standard Structural Steel Co., 1014 Wethersfield Ave.***plumbing, to O. Epstein, Inc., 38 Elm St.***electrical work, to Curtis Electric Co., 32 Adams St., Hartford***tile marble, to Central Marble & Tile Co., 56 Sanford St.*** windows sash steel, to Truscon Steel Co., Hartford***limestone, to Harris Co., Indianapolis, Ind.***excavation, to H. E. Putnam, 156 Woodland St., heating for office building on Pearl St., to C. N. Flagg & Co., Inc., Griswold St., Meriden***heating for office building, Trumbull St., to Libby & Blinn, Inc., 135 Sheldon St., for J. J. Corning Estate, c/o Hartford Conn. Trust Co., 750 Main St. Noted Sept. 27, under "Contracts Awarded."

Conn., New Haven—Marc Eidlitz & Sons, general contractors, 100 East 42nd St., New York, granite for Timothy Dwight unit, Temple, Grove and Wall Sts., to Perry Bros., Boston, Mass.*** bluestone, to American Blue Stone Co., 101 Park Ave., New York***excavating, shoring, sheet piling, to Blakeslee & Sons, Inc., 58 Waverly St., New Haven, for Yale University, T. W. Farnham, constr. supt. Noted July 19, under "Contracts Awarded."

N. J., Westfield—Col. Leigh M. Pearsall, constructing group of dwellings and tract development, Lawrence St., separate contracts. To exceed $100,000.

N. Y., New York—Godfrey Realty Corp., c/o Brooks, Harvey Co., 285 Madison Ave., altering heating, plumbing in 11 story, apartment, 228 East 12th St., to G. M. Weinstein Constr. Co., 1400 Bway. Est. $30,000.

Ont., Toronto—Sproatt & Rolph, archts., 1162 Bay St., general contract 6 story, basement, 100x100 ft., brick, steel, rein.-con., stone office, plain found., to Redfern Constr. Co. Ltd., 21 Parliament St., for Imperial Bank of Canada, 32 Wellington St. Est. $1,000,000. Noted Sept. 13.

INDUSTRIAL BUILDINGS

PROPOSED WORK

N. Y., New York—STABLE and STORAGE—Seven Hundred Forty Water St. Corp., G. Baxt, pres., 275 Cherry St., will award contract after Oct. 10, from bids by selected list contractors, for elevator, boiler room, gasoline storage, etc., for 3 story, stable and storage, 740 Water St. $28,000. Scacchetti & Siegel, 1850 Bway., archts.

BIDS ASKED

Md., Baltimore—GRAIN ELEVATOR, WORKHOUSE, etc.—Southern States Co-operative Mills, 2101 East Fort Ave., taking bids grain elevator workhouse, storage annex, structural steel feed storage annex, structural steel track shed, rein.-con. receiving pit and tunnels, 2101 East Fort Ave. $150,000. Carlstrand Eng. Co., 10 West Chase St., engr.

N. Y., New York—SERVICE GARAGE—See "Contracts Awarded."

CONTRACTS AWARDED

Ind., Indianapolis — BREWERY — Indiana Breweries, Inc., 946 West New York St., six 8,000 gal. new storage tanks, to Emerson Scheuring Tank Co., 2073 Martindale St. Est. $18,000.

Ind., Lawrenceburg—WAREHOUSE—Schenley Distilling Co., Schenley, Pa., general contract 8 story, basement, 150x105 ft., brick, steel, plain found., to F. Messer & Sons, Burnet Ave., Cincinnati, O., $200,000. C. J. Kiefer, Schmidt Bldg., Cincinnati, O., engrs.

Md., Baltimore—PLANT—Albert Kahn, Inc., archts., New Center Bldg., Detroit, Mich., 600x980 ft. assembling building, 50x240 ft. office building, 52x96 ft. boiler house, 85x245 ft. service building, 50x315 ft. loading dock, watchmen's houses, garage, Broening Hy., to Consolidated Eng. Co., 20 East Franklin St., for Chevrolet Motor Co., 3044 West Grand Blvd., Detroit, Mich., $1,228,000. Bids Sept. 28, awarded Sept. 28. Noted Sept. 27.

Mass., Everett—DRY ICE MANUFACTURING PLANT—New England Alcohol Co., Chemical Lane, 2 story, basement, 60x70 ft., brick, structural steel, concrete found., Chemical Lane, to York Ice Mchy. Corp., 200 Causeway St., Boston, $28,500 or more. Private plans.

Mass., South Boston (sta. Boston)—PLANT—White Fuel Co., 888 East 1st St., conveying machinery in connection with coal handling plant, to Robins Conveying Belt Co., 15 Park Row, New York; tower machinery, to Mead Morrison Mfg. Co., 3203 Vernon Blvd., Long Island City, N. Y. Awarded about Sept. 20.

Mich., Battle Creek—ELEVATOR UNITS—Postum Corp., Battle Creek, constructing 2 elevator units, each consisting of battery of 12 silos 26 ft. diam., 110 ft. high, rein.-con. construction, 1,500,000 bu. capacity, to James Stewart Corp., 343 South Dearborn St., Chicago, Ill.

Minn., St. Paul — WAREHOUSE-GARAGE — White Eagle Oil Corp., Federal Bank Bldg., Kansas City, Mo., H. Halvorson, mgr., Twin City Div., 606 Vandalia St., St. Paul, general contract 2 and 3 story, 134x138 ft., brick, tile, rein.-con., Vandalia and Wabash Sts., to G. J. Grant Constr. Co., 893 Como Blvd. Total est. $40,000.

Neb., Omaha—SERVICE—Firestone Tire & Rubber Co., 2566 Farnam St., general contract wrecking four 1 story brick store buildings, constructing iron and glass service station buildings, 1710 Dodge St., to A. H. Brodkey Co., 492 Saunders Kennedy Bldg.

N. J., Camden—BULK PLANT—Standard Oil Co. of New Jersey, 17 Washington St., Newark, bulk plant, 12th St. and Crescent Blvd., to Geo. W. Shuner & Son, Washington Ave., Palmyra, N. Y. Est. $100,000.

N. Y., New York—SERVICE GARAGE—Brookman Realty Co., G. D. Walker, pres., 165 Bway., service garage, separate contracts, $32,000 or more. R. Ralman, 20 Wood Ave., Amityville, archt. Noted Sept. 20.

N. Y., Syracuse — GASOLINE STATION — Colonial Beacon Oil Co., 20 Providence St., Boston, Mass., oil and gasoline storage tanks, concrete foundations, Solar St. $35,000. Owner builds. Private plans.

Pa., Pittsburgh — DAIRIES — Meadow Gold Dairies, Inc., Aurelia St., brick, concrete dairy buildings, to Henry Busse Co., 112 Wabash Ave., W.E., Pittsburgh, approximately $135,000. Bids Sept. 13. Noted Sept. 13.

Pa., Schenley—WAREHOUSE—Jos. S. Finch Co., Schenley, 8 story, basement, 150x150 ft., brick, rein.-con. bonded warehouse, 50,000 bbl. capacity, plain found., to Frank Messer & Sons, Burnet Ave., Cincinnati, O., $200,000. C. J. Kiefer, Schmidt Bldg., Cincinnati, O., engr.

Pa., Warren—DISTILLERY—Middleton Distilling Corp., distillery at former Ward Baking Co. yeast plant, 3 concrete silos with grain capacity of 21,000 bu. and warehouse with capacity of 20,000 bbls. and 23,000 cases of liquor, to Heller Bros. Co., Thurman and Furnace Sts., Youngstown, O. (tentative award.) Private plans. (**Correction**—Contractor's address). Noted Sept. 13.

Tenn., Cleveland — SERVICE STATION — G. Johnson, service station, Ocoll St., to William Howard & Sons, Athens, $37,750. Awarded Sept. 23. Noted Sept. 20.

Tenn., Maryville—OIL DISTRIBUTION, etc.—Sinclair Refining Co., 45 Nassau St., New York, oil distribution and bulk plant, Depot St., vicinity of Southern Railway Station, separate contracts now being awarded. $30,000 or more.

Tex., Houston — WAREHOUSE, etc. — R. J. Cummins, engr., Bankers Mortgage Bldg., general contract warehouse and train shed for Continental Can Co., 105 North Greenwood St., to Austin Co., 550 North Dearborn St., Chicago, Ill., $79,836***plumbing and heating, to Warren Co., 614 Walker St., $11,270***electrical work, to Jacobe Bros. Electric Co., 1014 Prairie Ave., $5,262. Grand total $96,368. Bids Sept. 19. Noted Sept. 20.

Tex., Houston—CREAMERY—Sanitary Farms Dairies, Inc., 2728 Washington St., 2 story, 75x100 ft., brick, hollow tile, steel, rein.-con. West Gray St., to Knutson Constr. Co., Union Natl. Bank Bldg., $51,953***electric wiring, to Fisk Electric Co., 3104 Milam St., $5,945*** plumbing, to O. R. Swanson, 6614 Capital St., $15,945. Grand total $73,843.

Tex., Longview—BOTTLING PLANT—B. F. Martin & J. Sanger, Longview, for Coca Cola bottling plant, 2 story, 50x100 ft., brick, rein.-con., to C. S. Lambie Constr. Co., Longview, $35,000 cost plus basis. Bids Sept. 14, awarded Sept. 17. Noted Sept. 20.

W. Va., Bluefield—PLANT—National Armature & Electric Co., Bluefield, altering and constructing brick, steel factory addition, to Heckart Constr. Co., 17 South High St., Columbus, O., about $30,000. R. R. Royce, 2176 North Parkway Ave., Columbus, O., engr.

B. C., Vancouver—DRY CLEANING PLANT—Nelson's Laundries, 2300 Cambie St., 1 story, basement, 72x99 ft., rein.-con. dry cleaning plant and garage in basement, Cambie St., to Snider Constr. Co., Ltd., 431 Granville, $40,000. Townley & Matheson, 325 Hower St., archts.

Ont., New Liskeard—FOUNDRY—Wabi Iron Wks., 1 story, 60x76 ft. and 1 story, 32x57 ft., brick foundry. Owner builds. H. B. Long, archt., Whitewood Ave., will supervise construction. Interested in prices complete equipment.

Ont., Toronto — PLANT — Liquid Carbonic Canadian Corp., 41 Mill St., plumbing for liquid carbonic gas and dry ice manufacturing plant, to A. H. Read & Son Ltd., 692 Shaw St.; structural steel, to Disher Constr. Co. Ltd., 80 Commissioner St. Noted Aug. 9.

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For official proposal advertising see Searchlight Section

†Federal Government.